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Department of
Agriculture



NRCS

Natural
Resources
Conservation
Service

In cooperation with
The Navajo Nation
Navajo Mountain Soil
and Water Conservation
District
Arizona Agricultural
Experiment Station

Soil Survey of Navajo Mountain Area, Arizona, Parts of Apache, Coconino and Navajo Counties



How To Use This Soil Survey

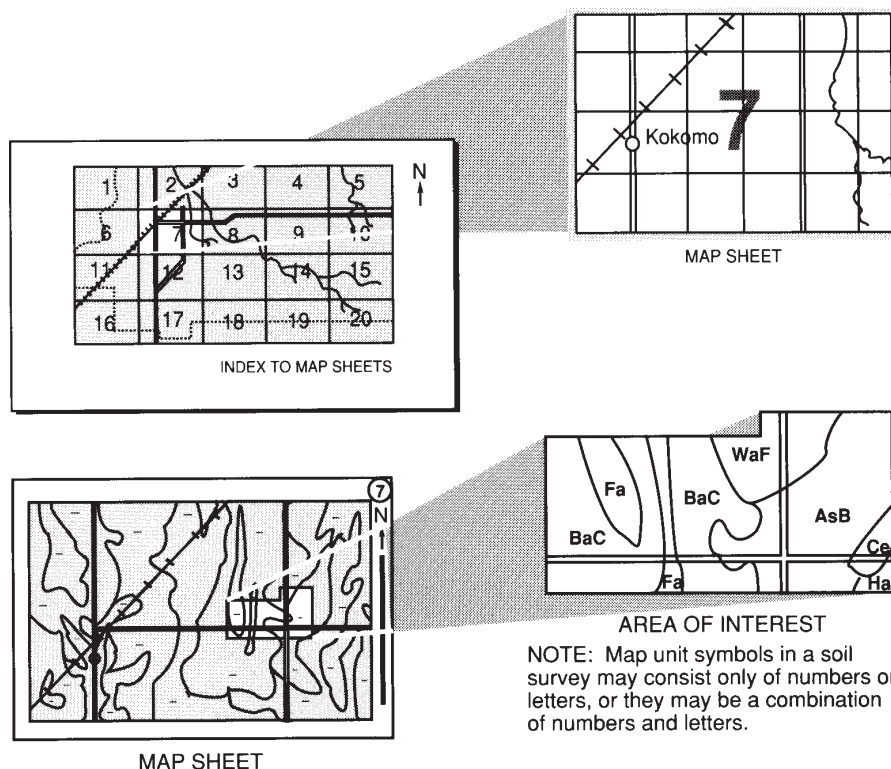
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in April 2008. Soil names and descriptions were approved in June 2008. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2008. This survey was made cooperatively by the Natural Resources Conservation Service; the Navajo Nation; the Navajo Mountain Soil and Water Conservation Service; and the Arizona Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Navajo Mountain Soil and Water Conservation District and the Navajo Nation.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: A visitor's view of Merrick Butte in Monument Valley. To the north, West Mitten Butte and Sentinel Mesa can be seen in the background. The buttes and mesa are in map unit 56, Torriorthents-Rock outcrop complex, 25 to 65 percent slopes. The foreground is in map unit 53, Sheppard-Sheppard, gypsic substratum complex, 2 to 11 percent slopes.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.

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Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of Navajo Mountain Area, Arizona, Parts of Apache, Coconino and Navajo Counties

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United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with The Navajo Nation, Navajo Mountain Soil and Water Conservation District, and Arizona Agricultural Experiment Station.

General Nature of the Survey Area

The Navajo Mountain soil survey covers approximately 2,559,440 acres in northeastern Coconino County, north Navajo County, and northwestern Apache County in Arizona (fig. 1). It includes grazing districts 1, 2, and 8 within Arizona. Elevations in the survey area range from about 3,700 feet at the bottom of Navajo Canyon to above 8,100 feet on Black Mesa. Most areas range from 5,000 to 6,500 feet in elevation.



Figure 1.—Location of Navajo Mountain Area in Arizona.

The survey area is mainly rangeland within the Colorado Plateau physiographic province. It is characterized by rough, broken terrain, including steep mountainous areas, plateaus, cuestas, and mesas intermingled with steep canyon walls, escarpments, and valleys. The survey area has been subject to volcanic activity, expressed as volcanic plugs such as El Capitan, north of Kayenta. The survey area has very little perennial surface water. Major watersheds are Navajo Creek and its many tributaries that feed into Lake Powell, and Laguna Creek near Kayenta that joins Chinle Wash to the east.

Coal mining, commercial woodcutting, tourism, and ranching are the most important enterprises in the survey area. The major coal mining area is on Black Mesa. The ranches are mainly cow-calf enterprises, but some are yearling operations. The survey area has very few acres of irrigated cropland and nonirrigated cropland. The main crops are alfalfa hay and winter wheat. The main factors that restrict land use for crops are short growing season, low rainfall, droughty soils, and inadequate irrigation.

Transportation Facilities

Three state highways currently serve the survey area. They are U.S. Highway 160, which runs southwest to northeast through Kayenta, Arizona; U.S. Highway 163, which runs north out of Kayenta, Arizona through Monument Valley; and State Highway 98, which connects Page, Arizona to U.S. Highway 160 near Cow Springs, Arizona.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable

them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research. Rangeland management specialists identified plant communities and assigned an ecological site to each map unit.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses. Soil scientists interpret the data from these analyses as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, name, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey area.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown

on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Sheppard fine sand, 1 to 5 percent slopes, is a phase of the Sheppard series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Needle-Sheppard complex, 2 to 12 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Jaconita-Anasazi association, 2 to 20 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Soil Descriptions

1—Aneth-Marcou-Typic Calcigypsids complex, 2 to 5 percent slopes

Map Unit Setting

Landform(s): pediments

Elevation: 5,000 to 5,600 feet (1,524 to 1,707 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Aneth and similar soils: 30 percent

Marcou and similar soils: 30 percent

Typic Calcigypsids and similar soils: 30 percent

Minor Components: 10 percent

- Active dunes and sand sheets
- Gullied land
- Soils with bedrock ranging from 22 to 40 inches

Soil Properties and Qualities

Aneth soils

Taxonomic classification: Sandy, mixed, mesic Typic Torriorthents

Geomorphic position: occurs on sand sheets on pediments

Parent material: eolian sands derived from sandstone

Slope: 2 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent
 moss: 0 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 18 percent
 woody debris: 1 percent
 bare soil: 81 percent
 rock fragments: 0 percent
Drainage class: excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Available water capacity total inches: 4.3 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: negligible
Hydrologic group: A
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: blackbrush, broom snakeweed, longleaf Mormon tea
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 56' 2.90" north, 109° 58' 58.20" west

C1—0 to 4 inches (0 to 10 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; slightly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C2—4 to 17 inches (10 to 43 cm); yellowish red (5YR 5/8) loamy sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.6; clear smooth boundary.

Bw—17 to 21 inches (43 to 53 cm); yellowish red (5YR 5/8) fine sandy loam, yellowish red (5YR 4/6), moist; 10 percent clay; massive; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.6; clear smooth boundary.

2Cn—21 to 60 inches (53 to 152 cm); yellowish red (5YR 5/8) fine sand, dark reddish brown (5YR 3/4), moist; 2 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.8.

Range in Characteristics

C horizons

Hue: 2.5YR, 5YR

Value: 3 to 5, dry or moist

Chroma: 4 to 8, dry or moist

Texture: fine sand, loamy sand

Clay: 2 to 8 percent
 Reaction: moderately alkaline or strongly alkaline

Bw horizon

Hue: 2.5YR, 5YR
 Value: 3 to 5, dry or moist
 Chroma: 4 to 8, dry or moist
 Texture: fine sand, loamy sand, loamy fine sand
 Clay: 9 to 12 percent
 Reaction: moderately alkaline or strongly alkaline

Cn horizon

Hue: 2.5YR, 5YR
 Value: 3 to 5, dry or moist
 Chroma: 4 to 8, dry or moist
 Texture: fine sand, loamy sand
 Clay: 2 to 8 percent
 Reaction: moderately alkaline or strongly alkaline

Some pedons do not have a Bw horizon.

Marcou soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, mesic Typic Torriorthents

Geomorphic position: occurs on sand sheets on structural benches

Parent material: eolian sands derived from sandstone over residuum weathered from mudstone

Slope: 2 to 5 percent

Surface cover:

Biological crust
 cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust
 salt: 0 percent
 gypsum: 0 percent

Physical cover
 canopy plant cover: 20 percent
 woody debris: 1 percent
 bare soil: 79 percent
 rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 6.0 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: negligible

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, yucca, blackbrush, galleta, longleaf Mormon tea, prickly Russian thistle, pricklypear and cholla

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 55' 56.30" north, 109° 58' 37.00" west

C1—0 to 7 inches (0 to 18 cm); yellowish red (5YR 4/6) loamy sand, dark red (2.5YR 3/6), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; violently effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C2—7 to 25 inches (18 to 64 cm); yellowish red (5YR 4/6) loamy fine sand, red (2.5YR 4/6), moist; 5 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few very fine and fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C3—25 to 36 inches (64 to 91 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 15 percent clay; weak coarse subangular blocky structure; moderately hard, very friable, moderately sticky and slightly plastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; few fine and medium carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

Cn—36 to 60 inches (91 to 152 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 10 percent clay; massive; moderately hard, very friable, slightly sticky and nonplastic; few very fine and fine roots throughout; common very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.8.

Range in Characteristics

C horizons

Hue: 2.5YR, 5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 to 8, dry or moist

Texture: loamy sand, sandy loam, loamy fine sand

Clay: 3 to 15 percent

Reaction: slightly alkaline to strongly alkaline

Cn horizon

Hue: 2.5YR, 5YR

Value: 4 to 6, dry or moist

Chroma: 3 to 6, dry or moist

Clay: 7 to 15 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: moderately alkaline or strongly alkaline

Typic Calcigypsid soils

Taxonomic classification: Typic Calcigypsid

Geomorphic position: occurs on pediments

Parent material: eolian sands derived from sandstone over residuum weathered from mudstone

Slope: 2 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 20 percent
 woody debris: 1 percent
 bare soil: 79 percent
 rock fragments: 0 percent
Drainage class: excessively drained
Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)
Available water capacity total inches: 8.9 (high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: low
Hydrologic group: B
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: Indian ricegrass, blackbrush, broom snakeweed, galleta, longleaf Mormon tea, prickly Russian thistle
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:
 36° 55' 57.60" north, 109° 58' 41.30" west

C—0 to 8 inches (0 to 20 cm); yellowish red (5YR 5/8) loamy sand, yellowish red (5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk1—8 to 20 inches (20 to 51 cm); red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6), moist; 30 percent clay; weak very coarse subangular blocky structure; soft, very friable, moderately sticky and moderately plastic; common very fine and fine roots throughout; common very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent, 19 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bk2—20 to 24 inches (51 to 61 cm); yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6), moist; 30 percent clay; weak coarse angular blocky structure; very hard, very firm, moderately sticky and very plastic; common very fine and fine, and few medium and coarse roots throughout; common very fine and fine dendritic tubular pores; common fine and medium carbonate masses in matrix; violently effervescent, 26 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

2Btky—24 to 48 inches (61 to 122 cm); light reddish brown (2.5YR 6/4) sandy clay loam, reddish brown (2.5YR 4/4), moist; 25 percent clay; weak coarse angular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; very few faint clay films on all faces of peds; common fine platy gypsum crystals and common medium, coarse, and very coarse carbonate masses in matrix; violently effervescent,

11 percent calcium carbonate equivalent and 15 percent gypsum; moderately alkaline, pH 8.0; clear wavy boundary.

2C—48 to 60 inches (122 to 152 cm); light red (2.5YR 6/6) gravelly sandy clay loam, red (2.5YR 4/6), moist; 20 percent clay; massive; extremely hard, extremely firm, slightly sticky and moderately plastic; few very fine roots throughout; few very fine dendritic tubular pores; 20 percent gravel; violently effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

Typic Calcigypsis have soil properties that vary outside of family class limits.

C horizon

Hue: 2.5YR, 5YR

Value: 4 or 5, dry or moist

Chroma: 6 or 8, dry or moist

Clay: 3 to 10 percent

Reaction: slightly alkaline or moderately alkaline

Bk horizons

Hue: 2.5YR, 5YR

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sandy clay loam, clay loam

Clay: 28 to 30 percent

Reaction: slightly alkaline or moderately alkaline

Calcium carbonate equivalent: 15 to 26 percent

2Btky horizon

Hue: 2.5YR, 5YR

Value: 5 or 6 dry, 4 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: sandy clay loam, clay loam

Clay: 25 to 30 percent

Reaction: slightly alkaline or moderately alkaline

Calcium carbonate equivalent: 5 to 12 percent

Gypsum: 5 to 20 percent

2C horizon

Hue: 2.5YR, 5YR

Value: 5 or 6 dry, 4 to 6 moist

Chroma: 4 or 6, dry or moist

Clay: 20 to 25 percent

Reaction: slightly alkaline or moderately alkaline

Calcic horizon—the zone from 8 to 24 inches (Bk1 and Bk2 horizons)

Gypsic horizon—the zone from 24 to 48 inches (2Btky horizon)

2—Arabrab-Vessilla-Lindrith complex, 1 to 45 percent slopes

Map Unit Setting

Landform(s): canyons, mesas

Elevation: 6,700 to 8,100 feet (2,042 to 2,468 meters)

Mean annual precipitation: 14 to 18 inches (355 to 457 millimeters)

Mean annual air temperature: 46 to 50 degrees F (8.0 to 10.0 degrees C)

Mean annual soil temperature: 48 to 52 degrees F (9.1 to 11.1 degrees C)

Frost-free period: 120 to 150 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-6AZ Colorado Plateau Pinyon-Juniper Sagebrush

Map Unit Composition

Arabrab and similar soils: 40 percent

Vessilla and similar soils: 40 percent

Lindrith and similar soils: 10 percent

Minor Components: 10 percent

- Moderately deep Arabrab similar soils
- Rock outcrop
- Riverwash
- Gullied land

Soil Properties and Qualities

Arabrab soils

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Haplustalfs

Geomorphic position: occurs on structural benches and ledges on mesa escarpments

Parent material: residuum weathered from sandstone and shale over eolian deposits derived from sandstone

Slope: 1 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 10 percent

lichen: 5 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 60 percent

woody debris: 20 percent

bare soil: 20 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 2.7 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very low

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Colorado pinyon, Stansbury cliffrose, Wyoming big sagebrush, juniper, oak, wheatgrass

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 37' 42.50" north, 110° 23' 6.60" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) sandy loam, dark brown (7.5YR 3/3), moist; 14 percent clay; weak coarse subangular blocky structure; soft, loose, nonsticky and nonplastic; common very fine and fine roots throughout; slightly effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Btk—3 to 15 inches (8 to 38 cm); brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4), moist; 27 percent clay; moderate medium subangular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; common fine tubular pores; continuous distinct clay bridges between sand grains and patchy faint clay films on surfaces along root channels; common fine carbonate masses lining pores; slightly effervescent, 1 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; gradual wavy boundary.

Bk—15 to 20 inches (38 to 51 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 14 percent clay; weak medium platy structure; moderately hard, friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine irregular pores; common fine carbonate masses lining pores; slightly effervescent, 2 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

R—20 inches (51 cm); fractured, unweathered sandstone and shale bedrock.

Range in Characteristics

A horizon

Value: 4 or 5 dry, 3 or 4 moist

Chroma: 3 or 4, dry or moist

Texture: loamy sand, sandy loam, fine sandy loam, loam

Clay: 10 to 18 percent

Btk horizon

Hue: 7.5YR, 5YR

Value: 4 or 5 dry, 3 or 4 moist

Chroma: 4 or 6, dry or moist

Texture: sandy clay loam, clay loam

Clay: 22 to 32 percent

Calcium carbonate equivalent: 0 to 4 percent

Bk horizon

Hue: 7.5YR, 5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, sandy loam, fine sandy loam, loam

Clay: 10 to 18 percent

Calcium carbonate equivalent: 0 to 4 percent

Argillic horizon—the zone from 3 to 15 inches (Btk horizon)

Vessilla soils

Taxonomic classification: Loamy, mixed, superactive, nonacid, mesic, shallow Aridic Ustorthents

Geomorphic position: occurs on structural benches and ledges on mesa escarpments

Parent material: alluvium derived from sandstone and shale over eolian deposits
derived from sandstone

Slope: 3 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 10 percent

bare soil: 40 percent

rock fragments

- channer: 10 percent

- flagstone: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic; 5 to 20 inches to bedrock, paralithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.3 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Gambel oak, Stansbury cliffrose, oneseed juniper, pinyon, ponderosa pine, wheatgrass

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 38' 27.30" north, 110° 22' 56.10" west

C1—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/3) sandy loam, dark brown (7.5YR 3/2), moist; 10 percent clay; single grain; loose, nonsticky and nonplastic; few fine and common medium roots throughout; 5 percent channer; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

C2—1 inch to 5 inches (3 to 13 cm); pink (7.5YR 7/3) channery loamy sand, light brown (7.5YR 6/3), moist; 6 percent clay; massive; soft, friable, nonsticky and nonplastic; few fine roots throughout; 34 percent channer; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

Cr—5 to 12 inches (13 to 30 cm); few coarse roots in cracks; fractured, weathered sandstone and shale bedrock.

R—12 inches (30 cm); fractured, unweathered sandstone and shale bedrock.

Range in Characteristics

Vessilla as used in this survey is a taxadjunct to the series because it has a paralithic contact above the lithic contact, is nonacid, and superactive. Vessilla series is a Loamy, mixed, active, calcareous, mesic Aridic Lithic Ustorthents.

Rock fragments of control section: 20 to 35 percent

C horizons

Value: 4 to 6 dry, 3 or 4 moist

Chroma: 2 to 6, dry or moist

Texture: loamy sand, sandy loam, fine sandy loam

Clay: 4 to 12 percent

Rock fragments: 5 to 35 percent

Lindrith soils

Taxonomic classification: Coarse-loamy, mixed, superactive, nonacid, mesic Aridic Ustorthents

Geomorphic position: occurs on stream terraces in canyon bottoms

Parent material: alluvium derived from sandstone and shale over eolian deposits derived from sandstone

Slope: 1 to 20 percent

Surface cover:

Biological crust

cyanobacteria: 10 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 10 percent

bare soil: 50 percent

rock fragments: 0 percent

Drainage class: somewhat excessively drained

Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)

Available water capacity total inches: 6.8 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Wyoming big sagebrush, juniper, pinyon, ponderosa pine, wheatgrass

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 38' 4.00" north, 110° 23' 0.20" west

A1—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4), moist; 15 percent clay; weak medium platy structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots throughout; many fine irregular pores; noneffervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

A2—2 to 15 inches (5 to 38 cm); 25 percent dark brown (7.5YR 3/2) and 75 percent brown (7.5YR 5/4) stratified sandy loam to loam, 25 percent dark brown (7.5YR 3/2) and 75 percent brown (7.5YR 4/4), moist; 12 percent clay; weak medium platy structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; many fine irregular pores; noneffervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

C1—15 to 23 inches (38 to 58 cm); brown (7.5YR 5/4) stratified sand to loam, brown (7.5YR 4/4), moist; 22 percent clay; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots throughout; many fine tubular pores; noneffervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

C2—23 to 41 inches (58 to 104 cm); brown (7.5YR 5/4) stratified fine sandy loam to loam, brown (7.5YR 4/4), moist; 15 percent clay; massive; hard, friable, nonsticky and nonplastic; few fine and medium roots throughout; many fine tubular pores; noneffervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

2C3—41 to 65 inches (104 to 165 cm); light brown (7.5YR 6/4) stratified sand to loam, brown (7.5YR 5/4), moist; 4 percent clay; massive; loose, nonsticky and nonplastic; few fine roots throughout; noneffervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Lindrith as used in this survey is a taxadjunct to the series because it has a nonacid reaction class. Lindrith series is a Coarse-loamy, mixed, superactive, calcareous, mesic Aridic Ustorthents.

A horizons

Value: 3 to 5, dry or moist
 Chroma: 2 to 4, dry or moist
 Texture: loamy sand, sandy loam, fine sandy loam, loam
 Clay: 10 to 18 percent

C horizons

Value: 3 to 6 dry, 2 to 5 moist
 Chroma: 2 to 4, dry or moist
 Texture: stratified loamy sand, sandy loam, fine sandy loam, loam, sand
 Clay: 2 to 25 percent

3—Arches-Pensom, moderately deep-Rock outcrop complex, 2 to 5 percent slopes

Map Unit Setting

Landform(s): structural benches
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)
Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush-Grassland

Map Unit Composition

Arches and similar soils: 65 percent
 Pensom, moderately deep and similar soils: 15 percent

Rock outcrop: 15 percent
 Minor Components: 5 percent

- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Arches soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments
Geomorphic position: occurs on sand sheets on structural benches
Parent material: residuum weathered from sandstone
Slope: 2 to 5 percent
Surface cover:

Biological crust
 cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 20 percent
 woody debris: 5 percent
 bare soil: 65 percent
 rock fragments
 • gravel: 20 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic; 5 to 20 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Available water capacity total inches: 0.8 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, yucca, broom snakeweed, Mormon tea, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:
 36° 59' 2.50" north, 110° 17' 20.00" west

C1—0 to 3 inches (0 to 8 cm); yellowish red (5YR 5/6) gravelly fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots throughout; few very fine and fine dendritic tubular pores; 20 percent gravel; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—3 to 14 inches (8 to 36 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 4/6), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic;

few very fine and fine, and common medium and coarse roots throughout; few very fine and fine dendritic tubular pores; 10 percent gravel; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

Cr—14 to 17 inches (36 to 43 cm); fractured, weathered sandstone bedrock.

R—17 inches (43 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Value: 4 to 6, dry or moist
 Chroma: 4 or 6, dry or moist
 Texture: fine sand, loamy fine sand
 Clay: 2 to 12 percent
 Reaction: slightly alkaline to strongly alkaline
 Rock fragments: 5 to 25 percent

Some pedons do not have a Cr horizon.

Some pedons have a Cn horizon that is strongly alkaline.

Pensom, moderately deep soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on sand sheets on structural benches

Parent material: residuum weathered from sandstone

Slope: 2 to 5 percent

Surface cover:

Biological crust
 cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust
 salt: 0 percent
 gypsum: 0 percent

Physical cover
 canopy plant cover: 10 percent
 woody debris: 5 percent
 bare soil: 85 percent
 rock fragments
 • gravel: 5 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Available water capacity total inches: 25.7 (very high)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: broom snakeweed, Mormon tea, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 59' 9.20" north, 110° 18' 56.10" west

C1—0 to 2 inches (0 to 5 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine and few medium roots throughout; 5 percent gravel; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C2—2 to 35 inches (5 to 89 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine and fine dendritic tubular pores; 5 percent channer; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C3—35 to 37 inches (89 to 94 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine and fine dendritic tubular pores; 10 percent channer; violently effervescent; moderately alkaline, pH 8.4; clear irregular boundary.

R—37 inches (94 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, loamy fine sand

Clay: 2 to 10 percent

Reaction: moderately alkaline or strongly alkaline

Rock fragments of control section: 5 to 10 percent

Rock outcrop

Exposures of flat or rolling bedrock, typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

4—Aridic Ustorthents-Royosa-Plumasano complex, 0 to 15 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 6,400 to 6,800 feet (1,951 to 2,073 meters)

Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)

Mean annual air temperature: 46 to 50 degrees F (8.0 to 10.0 degrees C)

Mean annual soil temperature: 48 to 52 degrees F (9.1 to 11.1 degrees C)

Frost-free period: 120 to 150 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-6AZ Colorado Plateau Pinyon-Juniper Sagebrush

Map Unit Composition

Aridic Ustorthents and similar soils: 30 percent

Royosa and similar soils: 30 percent

Plumasano and similar soils: 25 percent

Minor Components: 15 percent

- Rock outcrop
- Lithic Ustipsamments

Soil Properties and Qualities

Aridic Ustorthents soils

Taxonomic classification: Aridic Ustorthents

Geomorphic position: occurs on structural benches on mesa summits

Parent material: residuum weathered from mudstone and/or eolian sands derived from sandstone

Slope: 0 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 5 percent

lichen: 10 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 55 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 20 to 60 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)

Available water capacity total inches: 2.7 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, Wyoming big sagebrush, broom snakeweed, pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 37' 50.70" north, 110° 46' 13.20" west

C1—0 to 1 inch (0 to 3 cm); light yellowish brown (10YR 6/4) sand, dark yellowish brown (10YR 4/4), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine, fine, and medium dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C2—1 inch to 6 inches (3 to 15 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and

nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C3—6 to 18 inches (15 to 46 cm); strong brown (7.5YR 5/8) very fine sand, strong brown (7.5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots throughout; few fine dendritic tubular pores; few fine carbonate masses in matrix; noneffervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

2C4—18 to 28 inches (46 to 71 cm); yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6), moist; 22 percent clay; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots throughout; few fine and medium dendritic tubular pores; 2 percent prominent iron-manganese masses; common fine and medium carbonate masses in matrix; 4 percent gravel; strongly effervescent; moderately alkaline, pH 8.2; very abrupt wavy boundary.

2R—28 inches (71 cm); strongly effervescent; unfractured, weathered sandstone, mudstone, and shale bedrock.

Range in Characteristics

Aridic Ustorthents have soil properties that vary outside of family class limits.

C horizons

Hue: 2.5YR, 5YR, 7.5YR, 10YR

Value: 4 to 6, dry or moist

Chroma: 4 to 8, dry or moist

Texture: sand, very fine sand, fine sand, loamy fine sand, loamy sand, sandy loam, sandy clay loam, clay

Clay: 2 to 35 percent

Reaction: slightly alkaline to strongly alkaline

Royosa soils

Taxonomic classification: Mixed, mesic Aridic Ustipsamments

Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits

Parent material: eolian sands derived from sandstone

Slope: 2 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 3 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 5 percent

bare soil: 57 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 4.0 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, Utah juniper, Wyoming big sagebrush, blue grama, broom snakeweed, pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 37' 50.40" north, 110° 46' 27.20" west

C1—0 to 1 inch (0 to 3 cm); strong brown (7.5YR 5/6) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—1 inch to 10 inches (3 to 25 cm); yellowish red (5YR 4/6) sand, brown (7.5YR 4/4), moist; 3 percent clay; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C3—10 to 16 inches (25 to 41 cm); yellowish red (5YR 4/6) loamy sand, reddish brown (5YR 4/4), moist; 6 percent clay; massive; slightly hard, friable, slightly sticky and nonplastic; common very fine, fine, medium, and coarse roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C4—16 to 28 inches (41 to 71 cm); yellowish red (5YR 5/6) loamy sand, strong brown (7.5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; common fine carbonate masses in matrix; slightly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C5—28 to 41 inches (71 to 104 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; common fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

Cn—41 to 60 inches (104 to 152 cm); yellowish red (5YR 5/8) sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; hard, friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; common fine carbonate masses; violently effervescent; strongly alkaline, pH 8.8.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: find sand, very fine sand, loamy find sand, loamy very fine sand, sand, loamy sand

Clay: 3 to 8 percent

Reaction: slightly alkaline to strongly alkaline

Cn horizons

Hue: 5YR, 7.5YR
Value: 4 to 8, dry or moist
Chroma: 4 or 6, dry or moist
Texture: very fine sand, loamy fine sand, loamy very fine sand, sand
Clay: 2 to 8 percent
Reaction: slightly alkaline to strongly alkaline

Not all pedons have an *n* subdesignation.

Plumasano soils

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Aridic
Haplustepts

Geomorphic position: occurs on structural benches on mesa summits

Parent material: residuum weathered from mudstone and/or eolian sands derived
from sandstone

Slope: 2 to 5 percent

Surface cover:

Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust
salt: 0 percent
gypsum: 0 percent

Physical cover
canopy plant cover: 20 percent
woody debris: 5 percent
bare soil: 80 percent
rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Available water capacity total inches: 4.8 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:
36° 37' 49.90" north, 110° 47' 9.50" west

C—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few fine roots throughout; slightly effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bw—2 to 15 inches (5 to 38 cm); yellowish red (5YR 4/6) sandy loam, reddish brown (5YR 4/4), moist; 15 percent clay; moderate medium angular blocky and moderate coarse angular blocky structure; extremely hard, very firm, slightly sticky and

nonplastic; few very fine, fine, and medium roots throughout; common very fine, fine, and medium dendritic tubular pores; very slightly effervescent; slightly alkaline, pH 7.6; gradual smooth boundary.

Bk1—15 to 22 inches (38 to 56 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 12 percent clay; moderate coarse angular blocky structure; extremely hard, extremely firm, slightly sticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent, 3 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; gradual smooth boundary.

Bk2—22 to 52 inches (56 to 132 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 10 percent clay; moderate coarse angular blocky structure; extremely hard, extremely firm, slightly sticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; common medium carbonate nodules in matrix; violently effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear smooth boundary.

C'—52 to 63 inches (132 to 160 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 10 percent clay; massive; hard, firm, slightly sticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; common medium carbonate nodules in matrix; strongly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizon

Hue: 5YR, 7.5YR
Value: 4 or 5, dry or moist
Chroma: 4 or 6, dry or moist
Texture: fine sand, loamy fine sand, loam
Clay: 3 to 25 percent
Reaction: slightly alkaline or moderately alkaline

Bw horizon

Hue: 5YR, 7.5YR
Value: 4 or 5, dry or moist
Chroma: 4 or 6, dry or moist
Texture: sandy loam, fine sandy loam, loam
Clay: 8 to 25 percent
Reaction: slightly alkaline or moderately alkaline

Bk horizons

Hue: 2.5YR, 5YR, 7.5YR
Value: 4 to 6, dry or moist
Chroma: 4 or 6, dry or moist
Texture: loamy fine sand, sandy loam, fine sandy loam, loam, sandy clay loam, loamy sand
Clay: 8 to 25 percent
Calcium carbonate equivalent: 0 to 4 percent
Reaction: slightly alkaline or moderately alkaline

C' horizon

Hue: 2.5YR, 5YR
Value: 4 or 5, dry or moist
Chroma: 4 or 6, dry or moist
Texture: loamy fine sand, fine sandy loam, loam, sandy clay, loamy sand
Clay: 8 to 15 percent

Reaction: slightly alkaline or moderately alkaline

Cambic horizon—the zone from 2 to 22 inches (Bw and Bk1 horizons)

5—Begay-Pensom, moderately deep complex, 1 to 10 percent slopes

Map Unit Setting

Landform(s): fan remnants

Elevation: 5,600 to 5,900 feet (1,707 to 1,798 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Begay and similar soils: 70 percent

Pensom, moderately deep and similar soils: 25 percent

Minor Components: 5 percent

- Rock outcrop
- Active dunes and sand sheets

Soil Properties and Qualities

Begay soils

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Ustic

Haplocambids

Geomorphic position: occurs on relic stream terraces on fan remnants

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 3 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 70 percent

woody debris: 10 percent

bare soil: 50 percent

rock fragments

- gravel: 2 percent

Drainage class: well drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 5.0 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z. Limy, Fine

Ecological site number: R035XC373AZ

Present vegetation: Cutler Mormon tea, blue grama, galleta

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 27' 0.90" north, 111° 16' 25.40" west

C1—0 to 3 inches (0 to 8 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; 1 percent gravel; noneffervescent; neutral, pH 7.0; abrupt wavy boundary.

C2—3 to 8 inches (8 to 20 cm); brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; 2 percent gravel; noneffervescent; slightly alkaline, pH 7.8; clear broken boundary.

Bw—8 to 12 inches (20 to 30 cm); yellowish red (5YR 4/6) loamy fine sand, reddish brown (5YR 4/4), moist; 12 percent clay; moderate coarse prismatic parting to weak coarse angular blocky structure; hard, friable, nonsticky and nonplastic; few very fine and fine roots throughout; common very fine and few fine dendritic tubular pores; 3 percent gravel; noneffervescent; moderately alkaline, pH 7.9; clear irregular boundary.

Bk—12 to 19 inches (30 to 48 cm); red (2.5YR 4/6) fine sandy loam, red (2.5YR 4/6), moist; 17 percent clay; moderate coarse prismatic parting to weak coarse angular blocky structure; hard, friable, nonsticky and nonplastic; few fine and medium, and common very coarse roots throughout; few very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; 2 percent gravel; violently effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; gradual irregular boundary.

Cn—19 to 40 inches (48 to 102 cm); pink (5YR 7/4) loamy fine sand, reddish yellow (5YR 6/6), moist; 11 percent clay; massive; hard, friable, nonsticky and nonplastic; few fine roots throughout; common very fine dendritic tubular pores; violently effervescent; strongly alkaline, pH 8.7; clear broken boundary.

C—40 to 60 inches (102 to 152 cm); yellowish red (5YR 5/8) fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 5 to 7 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, sand

Clay: 1 to 6 percent

Reaction: neutral to moderately alkaline

Bw horizon

Hue: 2.5YR, 5YR

Value: 3 to 5 dry, 3 to 5 moist
 Chroma: 4 or 6, dry or moist
 Texture: loamy fine sand, fine sandy loam
 Clay: 10 to 20 percent
 Reaction: moderately alkaline or strongly alkaline

Bk horizon

Hue: 2.5YR, 5YR
 Value: 3 to 5 dry, 3 to 5 moist
 Chroma: 4 or 6, dry or moist
 Texture: fine sandy loam, loamy fine sand
 Clay: 15 to 25 percent
 Calcium carbonate equivalent: 0 to 4 percent

Cn and C horizons

Hue: 2.5YR, 5YR
 Value: 3 to 7, dry or moist
 Chroma: 4 to 8, dry or moist
 Texture: fine sandy loam, fine sand, sand, loamy fine sand
 Clay: 2 to 15 percent

Cambic horizon—the zone from 8 to 19 inches (Bw and Bk horizons)

Some pedons do not have a Bw horizon.

Pensom, moderately deep soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 1 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent
 woody debris: 3 percent
 bare soil: 60 percent
 rock fragments
 • gravel: 2 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.4 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Ephedra, Indian ricegrass, Utah juniper, broom snakeweed

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 25' 41.00" north, 111° 16' 29.00" west

C1—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

C2—2 to 6 inches (5 to 15 cm); strong brown (7.5YR 5/6) sand, strong brown (7.5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

2C3—6 to 24 inches (15 to 61 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; 2 percent gravel; noneffervescent; moderately alkaline, pH 8.4; very abrupt wavy boundary.

2R—24 inches (61 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Texture: fine sand, sand

Clay: 1 to 5 percent

Reaction: neutral to moderately alkaline

2C3 horizon

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, loamy fine sand

Clay: 1 to 10 percent

Reaction: moderately alkaline or strongly alkaline

6—Begay-Tsosie complex, 1 to 5 percent slopes

Map Unit Setting

Landform(s): fan remnants

Elevation: 5,700 to 6,700 feet (1,737 to 2,042 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Begay and similar soils: 55 percent
Tsosie and similar soils: 30 percent
Minor Components: 15 percent

- Mido and similar soils
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Begay soils

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Ustic
Haplocambids

Geomorphic position: occurs on stream terraces on fan remnants

Parent material: alluvium derived from sandstone and shale

Slope: 1 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 3 percent

bare soil: 67 percent

rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 6.0 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, Wyoming big sagebrush, blue grama, broom
snakeweed, galleta, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 30' 45.00" north, 110° 36' 56.00" west

C—0 to 3 inches (0 to 8 cm); brown (7.5YR 5/4) fine sandy loam, strong brown (7.5YR 4/6), moist; 14 percent clay; single grain; loose, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; noneffervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk1—3 to 14 inches (8 to 36 cm); strong brown (7.5YR 5/6) fine sandy loam, strong brown (7.5YR 4/6), moist; 17 percent clay; moderate coarse subangular blocky and

moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; slightly effervescent, 1 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Bk2—14 to 23 inches (36 to 58 cm); light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4), moist; 14 percent clay; moderate coarse subangular blocky and moderate medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; 2 percent gravel; strongly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

C1—23 to 53 inches (58 to 135 cm); yellowish brown (10YR 5/4) stratified fine sand to loamy fine sand, dark yellowish brown (10YR 4/4), moist; 12 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine carbonate masses in matrix; 10 percent gravel; strongly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

C2—53 to 60 inches (135 to 152 cm); strong brown (7.5YR 5/6) loamy fine sand, strong brown (7.5YR 4/6), moist; 10 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; 1 percent gravel; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

C horizon

Hue: 7.5YR, 10YR, 2.5Y

Chroma: 4 or 6, dry or moist

Texture: fine sandy loam, loamy fine sand, sandy loam

Clay: 8 to 17 percent

Reaction: slightly alkaline or moderately alkaline

Bk horizons

Hue: 7.5YR, 10YR, 2.5Y

Value: 4 to 6, dry

Chroma: 4 or 6, dry or moist

Texture: fine sandy loam, silt loam, loam, loamy fine sand

Clay: 10 to 17 percent

Reaction: slightly alkaline or moderately alkaline

Calcium carbonate equivalent: 0 to 4 percent

C1 and C2 horizons

Hue: 7.5YR, 10YR, 2.5Y

Value: 4 or 5, dry or moist

Chroma: 3 to 6, dry or moist

Texture: fine sand, loamy fine sand, loamy sand, loam, silty clay loam

Clay: 5 to 30 percent

Reaction: slightly alkaline or moderately alkaline

Cambic horizon—the zone from 3 to 23 inches (Bk horizons)

Tsossie soils

Taxonomic classification: Fine-loamy, mixed, superactive, calcareous, mesic Ustic Torriorthents

Geomorphic position: occurs on stream terraces on fan remnants

Parent material: alluvium derived from sandstone and shale

Slope: 1 to 5 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 30 percent

 woody debris: 5 percent

 bare soil: 70 percent

 rock fragments

- gravel: 1 percent

Drainage class: well drained

Ksat solum: 0.00 to 5.95 inches per hour (0.01 to 42.00 micrometers per second)

Available water capacity total inches: 10.5 (very high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: broom snakeweed, fourwing saltbush, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 32' 16.00" north, 110° 35' 10.00" west

A—0 to 3 inches (0 to 8 cm); light olive brown (2.5Y 5/4) fine sandy loam, olive brown (2.5Y 4/4), moist; 18 percent clay; weak very fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots throughout; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C1—3 to 12 inches (8 to 30 cm); light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/3), moist; 33 percent clay; moderate medium subangular blocky and moderate coarse subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; many very fine and fine and few medium roots throughout; many very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—12 to 24 inches (30 to 61 cm); light olive brown (2.5Y 5/4) stratified loamy fine sand to silt to silty clay loam, olive brown (2.5Y 4/3), moist; 32 percent clay; moderate medium subangular blocky and moderate fine subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine and few fine roots throughout; few very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C3—24 to 33 inches (61 to 84 cm); yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4), moist; 30 percent clay; weak coarse subangular blocky structure; moderately hard, friable, slightly sticky and moderately plastic; few very fine roots throughout; few very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C4—33 to 47 inches (84 to 119 cm); light olive brown (2.5Y 5/3) stratified loam to clay, olive brown (2.5Y 4/4), moist; 40 percent clay; massive; hard, firm, moderately sticky and very plastic; few very fine roots throughout; few very fine dendritic tubular pores; few fine and medium carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C5—47 to 60 inches (119 to 152 cm); light yellowish brown (2.5Y 6/3) clay loam, olive brown (2.5Y 4/3), moist; 28 percent clay; weak coarse subangular blocky and weak very coarse subangular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine roots throughout; few very fine dendritic tubular pores; few fine and medium carbonate masses in matrix; strongly effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

Range in Characteristics

A horizon

Hue: 10YR, 2.5Y
 Value: 3 to 5 dry, 3 to 4 moist
 Chroma: 3 or 4, dry or moist
 Texture: fine sandy loam, loam
 Clay: 14 to 20 percent
 Reaction: moderately alkaline or strongly alkaline

C horizons

Hue: 10YR, 2.5Y
 Chroma: 4 to 6, dry or moist
 Texture: clay loam, silt loam, silty clay loam, loam
 Clay: 25 to 35 percent
 Reaction: moderately alkaline or strongly alkaline

7—Berryhill family, 0 to 3 percent slopes

Map Unit Setting

Landform(s): playas
Elevation: 5,750 to 5,800 feet (1,753 to 1,768 meters)
Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Berryhill family and similar soils: 90 percent
 Minor Components: 10 percent

- Rehobeth family soils mantled by 20 inches or more of eolian sands
- Psammments and/or coarse-loamy Torriorthents
- Rock outcrop

Soil Properties and Qualities

Berryhill family soils

Taxonomic classification: Fine, mixed, superactive, mesic Chromic Gypsite

Geomorphic position: occurs on playas

Parent material: alluvium

Slope: 0 to 3 percent

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 3 percent

woody debris: 2 percent

bare soil: 97 percent

rock fragments: 0 percent

Drainage class: somewhat poorly drained

Ksat solum: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Available water capacity total inches: 9.0 (high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: frequent

Runoff class: negligible

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: broom snakeweed, saltcedar tamarisk

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 43' 23.00" north, 110° 16' 47.50" west

A—0 to 1 inch (0 to 3 cm); light brown (7.5YR 6/3) clay, strong brown (7.5YR 4/6), moist; 45 percent clay; strong thick platy structure; slightly hard, very friable, slightly sticky and very plastic; common very fine roots between peds; common very fine and fine, vesicular and dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

BA—1 inch to 5 inches (3 to 13 cm); light brownish gray (10YR 6/2) clay, brown (10YR 4/3), moist; 50 percent clay; strong very coarse prismatic parting to strong very thick platy structure; slightly hard, friable, slightly sticky and very plastic; common very fine roots throughout; few very fine and common medium dendritic tubular pores; 5 percent medium faint iron-manganese masses and 5 percent medium faint masses of oxidized iron in matrix; common fine prominent salt masses at top of horizon; violently effervescent; strongly alkaline, pH 8.6; gradual irregular boundary.

Bss1—5 to 14 inches (13 to 36 cm); pale brown (10YR 6/3) clay, dark grayish brown (10YR 4/2), moist; 50 percent clay; 5 percent medium faint brown (10YR 4/3) mottles; strong very coarse prismatic parting to strong very thick platy structure; hard, friable, slightly sticky and very plastic; common very fine dendritic tubular pores; very few faint slickensides (pedogenic) on top and bottom faces of peds; violently effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

Bss2—14 to 28 inches (36 to 71 cm); light brownish gray (2.5Y 6/2) clay, olive brown (2.5Y 4/3), moist; 60 percent clay; moderate very coarse prismatic structure; hard,

friable, moderately sticky and very plastic; few faint slickensides (pedogenic) on top and bottom faces of peds; 5 percent coarse distinct manganese masses in matrix; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Bkssy1—28 to 48 inches (71 to 122 cm); light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2), moist; 65 percent clay; moderate very coarse prismatic structure; hard, friable, moderately sticky and very plastic; very few distinct slickensides (pedogenic) on top and bottom faces of peds; 5 percent medium faint iron-manganese masses in matrix; common fine carbonate masses in matrix and common fine prominent gypsum masses in matrix; violently effervescent, 12 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; gradual smooth boundary.

Bkssy2—48 to 60 inches (122 to 152 cm); grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2), moist; 65 percent clay; moderate coarse prismatic structure; hard, friable, moderately sticky and very plastic; common fine dendritic tubular pores; very few faint slickensides (pedogenic) on top and bottom faces of peds; 5 percent medium faint iron-manganese masses in matrix; common fine prominent gypsum masses in matrix and common fine carbonate masses in matrix; violently effervescent, 12 percent calcium carbonate equivalent; moderately alkaline, pH 8.0.

Range in Characteristics

Berryhill family differs from the series because the series has an ustic aridic soil moisture regime.

Vertic properties: Cracks 0.5 to 2 inches wide ranging from 4 to 30 inches vertically when dry.

BA horizons

Hue: 7.5YR, 10YR

Value: 4 to 6, dry or moist

Chroma: 3 to 6, dry or moist

Clay: 30 to 55 percent

Texture: clay, clay loam, silty clay loam

Reaction: moderately alkaline or strongly alkaline

Bss horizons

Hue: 10YR, 2.5Y

Value: 4 to 6, dry or moist

Chroma: 3 or 4, dry or moist

Texture: clay, silty clay

Reaction: moderately alkaline or strongly alkaline

Gypsum: less than 5 percent

Slickensides: few to common

Vertic properties: Cracks 0.5 to 2 inches wide ranging from 4 to 30 inches vertically when dry.

Bkssy horizons

Hue: 10YR, 2.5Y

Value: 4 to 6, dry or moist

Chroma: 2 to 4, dry or moist

Texture: clay, silty clay

Reaction: moderately alkaline or strongly alkaline

Gypsum: 5 to 20 percent

Calcium carbonate equivalent: 5 to 15 percent

Slickensides: common to many

Gypsic horizon—the zone from 28 to 60 inches (Bkssy horizons)

8—Councelor-Moclom-Hawaikuh complex, 1 to 60 percent slopes

Map Unit Setting

Landform(s): fan remnants, mesas

Elevation: 5,800 to 6,100 feet (1,768 to 1,859 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: Ustic Aridic—35-3AZ Colorado Plateau Sagebrush—Grassland

Map Unit Composition

Councelor and similar soils: 40 percent

Moclom and similar soils: 35 percent

Hawaikuh and similar soils: 10 percent

Minor Components: 15 percent

- Pensom and similar soils
- Arches and similar soils
- Rock outcrop
- Gullied land

Soil Properties and Qualities

Councelor soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, mesic Ustic Torriorthents

Geomorphic position: occurs on stream terraces and stabilized sand sheets on fan remnants

Parent material: residuum weathered from sandstone and/or eolian sands derived from sandstone and shale

Slope: 1 to 40 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 3 percent

bare soil: 72 percent

rock fragments

- gravel: 10 percent
- cobble: 5 percent
- stone: 2 percent

Drainage class: excessively drained

Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)

Available water capacity total inches: 5.7 (moderate)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, yucca, blue grama, broom snakeweed, pinyon

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 39' 22.90" north, 110° 12' 50.60" west

C1—0 to 2 inches (0 to 5 cm); light brown (7.5YR 6/4) sand, brown (7.5YR 5/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; violently effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—2 to 8 inches (5 to 20 cm); brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4), moist; 14 percent clay; massive; loose, slightly sticky and nonplastic; common very fine, fine, and medium, and few coarse roots throughout; common very fine, fine, and medium, and few coarse and very coarse dendritic tubular pores; 2 percent gravel; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C3—8 to 13 inches (20 to 33 cm); brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4), moist; 20 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium, and few coarse roots throughout; common very fine, fine, and medium, and few coarse dendritic tubular pores; common coarse carbonate nodules in matrix; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C4—13 to 44 inches (33 to 112 cm); brown (7.5YR 5/4) sandy loam, strong brown (7.5YR 4/6), moist; 17 percent clay; massive; moderately hard, friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; common coarse carbonate nodules in matrix; violently effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C5—44 to 60 inches (112 to 152 cm); strong brown (7.5YR 5/6) loamy sand, strong brown (7.5YR 4/6), moist; 6 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few medium carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 7 dry, 4 or 6 moist

Chroma: 2 to 6 dry, 4 or 6 moist

Texture: sand, fine sand, loamy sand, sandy loam, fine sandy loam, loam, sandy clay loam, clay loam, sandy clay, clay

Clay: 2 to 40 percent

Reaction: moderately alkaline or strongly alkaline

Moclom soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments

Geomorphic position: occurs on ledges on mesa escarpments

Parent material: eolian sands derived from sandstone

Slope: 1 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 3 percent

bare soil: 62 percent

rock fragments

- gravel: 20 percent

- cobble: 2 percent

- stone: 1 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.3 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, Utah juniper, yucca, pinyon

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 38' 54.30" north, 110° 12' 57.30" west

C1—0 to 4 inches (0 to 10 cm); light yellowish brown (2.5Y 6/4) sand, light olive brown (2.5Y 5/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; 1 percent gravel; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—4 to 18 inches (10 to 46 cm); light yellowish brown (10YR 6/4) sand, dark yellowish brown (10YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots throughout; few very fine and fine dendritic tubular pores; common fine carbonate masses in matrix; 1 percent gravel; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

2R—18 inches (46 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 10YR, 2.5Y

Value: 5 or 6 dry, 4 to 6 moist

Chroma: 3 to 6, dry or moist

Texture: coarse sand, sand, fine sand, loamy sand, loamy fine sand

Clay: 2 to 6 percent

Reaction: moderately alkaline or strongly alkaline

Hawaikuh soils

Taxonomic classification: Fine, mixed, superactive, mesic Ustic Haplargids

Geomorphic position: occurs on fan remnants

Parent material: residuum weathered from sandstone and/or eolian sands derived from sandstone and shale

Slope: 1 to 6 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 2 percent

bare soil: 63 percent

rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Available water capacity total inches: 8.1 (high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, pinyon

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 38' 25.90" north, 110° 13' 4.30" west

C—0 to 4 inches (0 to 10 cm); brown (7.5YR 5/4) loamy sand, brown (7.5YR 4/3), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; noneffervescent; moderately alkaline, pH 8.0; clear smooth boundary.

Bw—4 to 19 inches (10 to 48 cm); strong brown (7.5YR 4/6) sandy clay loam, dark brown (7.5YR 3/4), moist; 30 percent clay; weak very coarse angular blocky structure; slightly hard, very friable, slightly sticky and very plastic; common very fine and fine

roots throughout; common very fine and few fine and medium dendritic tubular pores; common fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

2Btk—19 to 29 inches (48 to 74 cm); yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4), moist; 40 percent clay; moderate coarse prismatic parting to weak medium angular blocky structure; very hard, friable, slightly sticky and very plastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; very few distinct clay films on all faces of peds; common fine and medium carbonate nodules in matrix; violently effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; gradual wavy boundary.

2Bk1—29 to 37 inches (74 to 94 cm); yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4), moist; 20 percent clay; massive; hard, firm, nonsticky and slightly plastic; few very fine roots throughout; few very fine dendritic tubular pores; common fine and medium carbonate masses in matrix; violently effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

2Bk2—37 to 45 inches (94 to 114 cm); dark yellowish brown (10YR 4/4) clay, dark yellowish brown (10YR 3/4), moist; 40 percent clay; moderate medium prismatic structure; hard, friable, slightly sticky and very plastic; few very fine and fine roots between peds; few very fine dendritic tubular pores; common fine, medium, and coarse carbonate nodules in matrix; violently effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.8; abrupt wavy boundary.

3C—45 to 60 inches (114 to 152 cm); strong brown (7.5YR 5/6) loamy fine sand, strong brown (7.5YR 4/6), moist; 8 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; common fine and medium carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

C horizon

Hue: 7.5YR, 10YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6 dry, 3 to 6 moist

Texture: loamy sand, loamy fine sand, sandy loam

Clay: 5 to 15 percent

Reaction: moderately alkaline or strongly alkaline

Bw horizon

Hue: 5YR, 7.5 YR, 10YR

Value: 4 to 6 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: clay loam, sandy clay loam, sandy clay, silty clay

Clay: 25 to 40 percent

Reaction: moderately alkaline or strongly alkaline

2Btk horizon

Hue: 7.5YR, 10YR

Value: 5 or 6 dry, 4 to 6 moist

Chroma: 3 or 4, dry or moist

Texture: clay loam, sandy clay, clay

Clay: 35 to 40 percent

Reaction: moderately alkaline or strongly alkaline

Calcium carbonate equivalent: 0 to 4 percent

2Bk horizons

Hue: 7.5YR, 10YR

Value: 4 or 6 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: clay loam, sandy clay loam, sandy clay, clay

Clay: 20 to 40 percent

Reaction: moderately alkaline or strongly alkaline

Calcium carbonate equivalent: 0 to 4 percent

3C horizon

Hue: 7.5YR, 10YR, 2.5Y

Value: 5 or 6 dry, 4 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, loamy fine sand

Clay: 8 to 10

Reaction: moderately alkaline or strongly alkaline

Argillic horizon—the zone from 19 to 29 inches (2Btk horizon)

9—Denazar-Sheppard-Lithic Torriorthents complex, 1 to 20 percent slopes**Map Unit Setting***Landform(s):* dune fields, structural benches*Elevation:* 5,400 to 5,900 feet (1,646 to 1,798 meters)*Mean annual precipitation:* 6 to 10 inches (152 to 254 millimeters)*Mean annual air temperature:* 54 to 57 degrees F (12.0 to 14.0 degrees C)*Mean annual soil temperature:* 56 to 59 degrees F (13.1 to 15.1 degrees C)*Frost-free period:* 150 to 180 days*Major Land Resource Area:* 35; Colorado Plateau*Land Resource Unit:* 35-2AZ Colorado Plateau Cold Desert Shrub**Map Unit Composition**

Denazar and similar soils: 45 percent

Sheppard and similar soils: 30 percent

Lithic Torriorthents and similar soils: 15 percent

Minor Components: 10 percent

- Rock outcrop
- Cuncelor and similar soils
- Gullied land

Soil Properties and Qualities**Denazar soils***Taxonomic classification:* Sandy, mixed, mesic Typic Haplocalcids*Geomorphic position:* occurs on sand sheets on structural benches*Parent material:* eolian sands derived from sandstone over residuum weathered from sandstone*Slope:* 2 to 20 percent*Surface cover:*

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 65 percent

woody debris: 5 percent

bare soil: 40 percent

rock fragments

- gravel: 1 percent

Drainage class: excessively drained*Ksat solum:* 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)*Available water capacity total inches:* 4.4 (low)*Shrink-swell potential:* about 1.5 LEP (low)*Flooding hazard:* none*Runoff class:* low*Hydrologic group:* A*Ecological site name:* not provided*Ecological site number:* not provided*Present vegetation:* Ephedra, broom snakeweed*Land capability (non irrigated):* 7c**Typical Profile****Location****Geographic Coordinate System:**

36° 36' 20.40" north, 109° 57' 1.00" west

C—0 to 1 inch (0 to 3 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

Bk1—1 inch to 16 inches (3 to 41 cm); strong brown (7.5YR 5/6) loamy sand, strong brown (7.5YR 4/6), moist; 4 percent clay; weak very coarse angular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine and few medium, coarse, and very coarse roots throughout; few very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear smooth boundary.

Bk2—16 to 21 inches (41 to 53 cm); reddish yellow (7.5YR 6/6) loamy sand, strong brown (7.5YR 4/6), moist; 6 percent clay; weak very coarse angular blocky structure; moderately hard, friable, slightly sticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; few fine carbonate nodules in matrix; violently effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

2Bkk—21 to 40 inches (53 to 102 cm); light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4), moist; 10 percent clay; weak medium angular blocky structure; hard, firm, slightly sticky and slightly plastic; many very fine roots between peds; few very fine dendritic tubular pores; many very coarse carbonate masses along faces of peds; 5 percent gravel; violently effervescent, 10 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear irregular boundary.

2Bkn—40 to 60 inches (102 to 152 cm); 30 percent pale yellow (5Y 7/4) and 70 percent reddish yellow (7.5YR 6/6) loamy sand, strong brown (7.5YR 5/6), moist; 5 percent clay; massive; soft, very friable, slightly sticky and nonplastic; common very fine and fine and few medium roots throughout; few very fine and fine dendritic

tubular pores; common coarse carbonate concretions in matrix; 2 percent gravel; violently effervescent, 10 percent calcium carbonate equivalent; strongly alkaline, pH 8.8.

Range in Characteristics

C horizon

Hue: 5YR, 7.5YR
 Value: 4 or 5, dry or moist
 Chroma: 4 or 6, dry or moist
 Texture: sand, fine sand, loamy fine sand
 Clay: 2 to 7 percent
 Reaction: slightly alkaline to strongly alkaline

Bk horizons

Hue: 7.5YR, 10YR
 Value: 5 to 7 dry, 4 to 7 moist
 Chroma: 2 to 6, dry or moist
 Texture: fine sand, loamy sand
 Clay: 4 to 7 percent
 Reaction: moderately alkaline or strongly alkaline
 Calcium carbonate equivalent: 0 to 4 percent

2Bkk and 2Bkn horizons

Hue: 7.5YR, 10YR, 5Y
 Value: 5 to 7 dry, 4 to 7 moist
 Chroma: 2 to 6, dry or moist
 Texture: fine sand, sandy loam, loamy sand
 Clay: 2 to 10 percent
 Calcium carbonate equivalent: 5 to 15 percent

Calcic horizon—the zone from 21 to 60 inches (2Bkk and 2Bkn horizons)

Some pedons do not have a 2Bkk horizon.

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on sand sheets and dunes in dune fields

Parent material: eolian sands derived from sandstone

Slope: 1 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent
 woody debris: 5 percent
 bare soil: 40 percent
 rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: yucca, blue grama, globemallow, longleaf Mormon tea, sand
muhly

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 38' 4.00" north, 109° 57' 8.10" west

C1—0 to 1 inch (0 to 3 cm); reddish yellow (7.5YR 6/6) sand, strong brown (7.5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—1 inch to 16 inches (3 to 41 cm); light brown (7.5YR 6/4) sand, brown (7.5YR 4/4), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium and coarse roots throughout; few very fine dendritic tubular pores; few fine carbonate masses, in matrix; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C3—16 to 32 inches (41 to 81 cm); reddish yellow (7.5YR 6/6) sand, strong brown (7.5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and coarse roots throughout; few very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; 1 percent gravel; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C4—32 to 56 inches (81 to 142 cm); reddish yellow (7.5YR 6/6) fine sand, strong brown (7.5YR 5/6), moist; 2 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; 1 percent gravel; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C5—56 to 60 inches (142 to 152 cm); light brown (7.5YR 6/4) fine sand, strong brown (7.5YR 5/6), moist; 2 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; few fine carbonate masses in matrix; 1 percent gravel; violently effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 5 to 7, dry or moist

Chroma: 4 or 8, dry or moist

Texture: fine sand, loamy fine sand, sand, loamy sand

Clay: 2 to 8 percent

Reaction: moderately alkaline or strongly alkaline

Lithic Torriorthents soils

Taxonomic classification: Lithic Torriorthents

Geomorphic position: occurs on escarpments and erosion remnants on structural benches

Parent material: colluvium derived from calcareous sandstone

Slope: 6 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 10 percent

woody debris: 1 percent

bare soil: 89 percent

rock fragments

- gravel: 60 percent

- cobble: 20 percent

- stone: 10 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 5.95 to 99.92 inches per hour (42.00 to 705.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.4 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: blue grama, longleaf Mormon tea, sand muhly

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 35' 25.70" north, 109° 56' 30.60" east

C1—0 to 4 inches (0 to 10 cm); light yellowish brown (10YR 6/4) extremely gravelly coarse sand, yellowish brown (10YR 5/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; 60 percent gravel and 2 percent cobble; strongly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C2—4 to 14 inches (10 to 36 cm); light yellowish brown (10YR 6/4) gravelly coarse sand, yellowish brown (10YR 5/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; 25 percent gravel and 1 percent cobble; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

R—14 inches (36 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

Lithic Torriorthents have soil properties that vary outside of family class limits.

C horizons

Hue: 7.5YR, 10YR

Value: 5 or 6, dry or moist
 Chroma: 4 or 6, dry or moist
 Texture: fine sand, coarse sand
 Clay: 2 to 3 percent
 Rock fragments: 25 to 65 percent
 Reaction: moderately alkaline or strongly alkaline

10—Earlweed-Shoegame complex, 2 to 6 percent slopes

Map Unit Setting

Landform(s): mesas
Elevation: 5,200 to 5,700 feet (1,585 to 1,737 meters)
Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)
Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Earlweed and similar soils: 60 percent
 Shoegame and similar soils: 30 percent
 Minor Components: 10 percent

- Arches and similar soils
- Ustic Petrocalcids
- Active dunes and sand sheets

Soil Properties and Qualities

Earlweed soils

Taxonomic classification: Sandy, mixed, mesic Ustic Haplocalcids
Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits
Parent material: eolian sands derived from sandstone over residuum weathered from sandstone
Slope: 2 to 6 percent
Surface cover:

- Biological crust
 - cyanobacteria: 0 percent
 - lichen: 0 percent
 - moss: 0 percent
- Chemical crust
 - salt: 0 percent
 - gypsum: 0 percent
- Physical cover
 - canopy plant cover: 70 percent
 - woody debris: 0 percent
 - bare soil: 60 percent
 - rock fragments
 - gravel: 2 percent

Drainage class: excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Available water capacity total inches: 4.6 (low)
Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: negligible

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z. Limy Subsurface

Ecological site number: R035XC375AZ

Present vegetation: Ephedra cutleri, blackbrush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 45' 11.40" north, 111° 2' 7.60" west

C1—0 to 3 inches (0 to 8 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

C2—3 to 16 inches (8 to 41 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots top of horizon and common fine roots throughout; common very fine and fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; gradual wavy boundary.

C3—16 to 28 inches (41 to 71 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

Bk—28 to 44 inches (71 to 112 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine dendritic tubular pores; common medium carbonate masses in matrix; strongly effervescent, 10 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; gradual wavy boundary.

C—44 to 60 inches (112 to 152 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 3 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; common very fine roots throughout; common very fine dendritic tubular pores; violently effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

C1, C2, and C3 horizons

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy sand

Clay: 2 to 6 percent

Reaction: slightly alkaline or moderately alkaline

Bk horizon

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy sand

Clay: 3 to 6 percent

Reaction: moderately alkaline or strongly alkaline

Calcium carbonate equivalent: 5 to 15 percent

C horizon

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy sand

Clay: 3 to 6 percent

Calcic horizon—the zone from 28 to 44 inches (Bk horizon)

Shoegame soils

Taxonomic classification: Sandy over loamy, mixed, mesic Ustic Haplocalcids

Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 2 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 40 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 70 percent

woody debris: 0 percent

bare soil: 50 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 40 to 60 inches to bedrock, paralithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: negligible

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z. Limy, Fine

Ecological site number: R035XC373AZ

Present vegetation: Ephedra cutleri, blackbrush, sand dropseed

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 46' 17.00" north, 111° 2' 33.20" west

C—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/4) fine sand, strong brown (7.5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common very fine roots throughout; noneffervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

Bw—2 to 9 inches (5 to 23 cm); red (2.5YR 4/6) loamy fine sand, dark red (2.5YR 3/6), moist; 10 percent clay; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout;

common very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk1—9 to 21 inches (23 to 53 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots throughout; common very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent, 10 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; gradual wavy boundary.

Bk2—21 to 32 inches (53 to 81 cm); light reddish brown (5YR 6/4) loam, yellowish red (5YR 4/6), moist; 15 percent clay; weak coarse subangular blocky structure; moderately hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine dendritic tubular pores; common medium and coarse carbonate masses in matrix; violently effervescent, 10 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; abrupt wavy boundary.

2C—32 to 43 inches (81 to 109 cm); light reddish brown (5YR 6/4) very cobbly sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; hard, very friable, nonsticky and nonplastic; common very fine roots in cracks; many extremely coarse carbonate masses in matrix; 40 percent cobble; violently effervescent; strongly alkaline, pH 8.6; diffuse wavy boundary.

2Cr—43 inches (109 cm); fractured, weathered sandstone, mudstone, and shale bedrock.

Range in Characteristics

Shoegame as used in this survey is a taxadjunct to the series because it has contrasting textures and is deep to a paralithic contact. Shoegame is a Sandy-skeletal, mixed, mesic Ustic Haplocalcids.

C horizon

Hue: 5YR, 7.5YR
Value: 4 to 6, dry or moist
Chroma: 4 or 6, dry or moist
Texture: sand, fine sand, loamy sand
Clay: 3 to 6 percent
Reaction: slightly alkaline or moderately alkaline

Bw horizon

Hue: 2.5YR, 5YR
Value: 4 to 6, dry, 3 to 6 moist
Chroma: 4 or 6, dry or moist
Texture: fine sand, loamy fine sand, sandy loam
Clay: 6 to 10 percent
Reaction: slightly alkaline or moderately alkaline

Bk horizons

Hue: 5YR, 7.5YR
Value: 4 to 6, dry or moist
Chroma: 4 or 6, dry or moist
Texture: fine sand, loamy fine sand, loam
Clay: 5 to 15 percent
Reaction: slightly alkaline or moderately alkaline
Calcium carbonate equivalent: 5 to 15 percent

2C horizon

Hue: 2.5YR, 5YR

Value: 4 to 6, dry or moist
 Chroma: 4 or 6, dry or moist
 Texture: sand, fine sand, loamy fine sand
 Clay: 3 to 6 percent

Calcic horizon—the zone from 9 to 32 inches (Bk horizons)

11—Eslendo family-Simel-Pensom complex, 3 to 10 percent slopes

Map Unit Setting

Landform(s): mesas
Elevation: 5,700 to 5,900 feet (1,737 to 1,798 meters)
Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)
Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: Ustic Aridic—35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Eslendo family and similar soils: 50 percent
 Simel and similar soils: 30 percent
 Pensom and similar soils: 15 percent
 Minor Components: 5 percent
 • Rizno and similar soils

Soil Properties and Qualities

Eslendo family soils

Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic, shallow
 Ustic Torriorthents
Geomorphic position: occurs on stabilized sand sheets on mesa summits
Parent material: eolian sands derived from sandstone over residuum weathered from sandstone and shale
Slope: 3 to 10 percent
Surface cover:
 Biological crust
 cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 25 percent
 woody debris: 2 percent
 bare soil: 73 percent
 rock fragments
 • gravel: 4 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic; 14 to 60 inches to bedrock, lithic
Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 2.1 (very low)

Shrink-swell potential: about 1.9 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: broom snakeweed, longleaf Mormon tea

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 51' 51.50" north, 110° 13' 31.30" west

C1—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 5/6) loamy fine sand, strong brown (7.5YR 4/6), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C2—2 to 8 inches (5 to 20 cm); yellowish red (5YR 5/6) loamy fine sand, strong brown (7.5YR 4/6), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C3—8 to 18 inches (20 to 46 cm); strong brown (7.5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 10 percent clay; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; 4 percent gravel; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

2Cr—18 to 28 inches (46 to 71 cm); few fine roots in cracks; fractured, weathered sandstone bedrock.

2R—28 inches (71 cm); fractured, unweathered mudstone and sandstone bedrock.

Range in Characteristics

Eslendo family differs from the series because it has a lithic contact under the paralithic contact, less than 18 percent clay in the particle-size control section, and hues of 5YR.

C horizons

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, loamy fine sand, loamy very fine sand, sandy loam, fine sandy loam, sandy clay loam, clay loam

Clay: 5 to 38 percent

Reaction: slightly alkaline or moderately alkaline

Simel soils

Taxonomic classification: Clayey, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents

Geomorphic position: occurs on structural benches on mesa summits

Parent material: residuum weathered from mudstone

Slope: 3 to 10 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 20 percent

 woody debris: 1 percent

 bare soil: 79 percent

 rock fragments

 • channer: 60 percent

 • flagstone: 20 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.7 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: broom snakeweed, longleaf Mormon tea, prickly Russian thistle

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 52' 44.20" north, 110° 12' 41.10" west

C1—0 to 1 inch (0 to 3 cm); yellowish red (5YR 4/6) very channery sandy clay loam, dark red (2.5YR 3/6), moist; 34 percent clay; massive; soft, very friable, slightly sticky and slightly plastic; few very fine roots throughout; few very fine dendritic tubular pores; 35 percent channer and 1 percent flagstone; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—1 inch to 5 inches (3 to 13 cm); yellowish red (5YR 4/6) sandy clay, dark reddish brown (5YR 3/4), moist; 40 percent clay; massive; soft, very friable, moderately sticky and moderately plastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; 1 percent channer; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

R—5 inches (13 cm); unfractured, weathered mudstone and sandstone bedrock.

Range in Characteristics

Simel as used in this survey is a taxadjunct to the series because of clayey textures and a lithic contact. Simel series is a Loamy, mixed, superactive, calcareous, mesic, shallow Ustic Torriorthents.

C horizons

Hue: 5YR, 7.5YR
 Value: 4 to 6 dry, 3 or 4 moist
 Chroma: 4 or 6, dry or moist
 Texture: sandy clay loam, sandy clay
 Clay: 25 to 40 percent
 Reaction: slightly alkaline or moderately alkaline

Pensom soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits

Parent material: eolian sands derived from sandstone

Slope: 3 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 14 percent
 woody debris: 1 percent
 bare soil: 85 percent
 rock fragments: 0 percent

Depth to restrictive feature(s): 40 to 60 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 3.5 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: yucca, broom snakeweed, longleaf Mormon tea

Land capability (non irrigated): 6c

Typical Profile*Location*

Geographic Coordinate System:

36° 52' 22.80" north, 110° 13' 0.50" west

C1—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 5/6), moist; 5 percent clay; massive; soft, loose, nonsticky and nonplastic; common very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

C2—1 inch to 16 inches (3 to 41 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 5/6), moist; 3 percent clay; massive; soft, loose, nonsticky and nonplastic; common very fine and fine roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C3—16 to 41 inches (41 to 104 cm); reddish yellow (5YR 6/6) loamy fine sand, yellowish red (5YR 5/6), moist; 4 percent clay; massive; soft, loose, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

R—41 inches (104 cm); fractured, unweathered mudstone and sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 5 or 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: loamy fine sand, loamy sand

Clay: 3 to 5 percent

Reaction: slightly alkaline or moderately alkaline

12—Florita, moderately deep-Rizno-Rock outcrop complex, 0 to 5 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 5,500 to 6,500 feet (1,676 to 1,981 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: Ustic Aridic—35-3AZ Colorado Plateau Sagebrush—Grassland

Map Unit Composition

Florita, moderately deep and similar soils: 50 percent

Rizno and similar soils: 30 percent

Rock outcrop: 10 percent

Minor Components: 10 percent

- Mido and similar soils
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Florita, moderately deep soils

Taxonomic classification: Coarse-loamy, mixed, superactive, nonacid, mesic Ustic Torriorthents

Geomorphic position: occurs on stabilized sand sheets on mesa summits

Parent material: residuum weathered from mudstone and/or eolian sands derived from sandstone

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 40 percent
 woody debris: 5 percent
 bare soil: 55 percent
 rock fragments: 0 percent
Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 2.7 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very low
Hydrologic group: B
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: Utah juniper, yucca, broom snakeweed, globemallow, longleaf Mormon tea
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:
 36° 41' 38.70" north, 111° 23' 1.70" west

C1—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 5/6) sand, brown (7.5YR 4/4), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; many very fine, fine, and medium roots throughout; common very fine irregular pores; noneffervescent; neutral, pH 7.2; very abrupt smooth boundary.

C2—2 to 8 inches (5 to 20 cm); strong brown (7.5YR 4/6) loamy sand, brown (7.5YR 4/4), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; common very fine, fine, and coarse roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

C3—8 to 21 inches (20 to 53 cm); yellowish red (5YR 4/6) sandy loam, dark reddish brown (5YR 3/4), moist; 12 percent clay; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

2Bkn—21 to 30 inches (53 to 76 cm); light brown (7.5YR 6/4) sandy loam, yellowish red (5YR 5/6), moist; 15 percent clay; moderate very coarse angular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots in cracks; few very fine irregular pores; many coarse carbonate masses on faces of peds; 5 percent gravel; strongly effervescent, 1 percent calcium carbonate equivalent; strongly alkaline, pH 8.8; gradual smooth boundary.

2R—30 inches (76 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

Florita family differs from the series because the series does not have a moderately deep lithic contact or hues of 5YR.

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 or 4 moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy sand, sandy loam, sandy clay loam

Clay: 2 to 25 percent

Reaction: neutral to strongly alkaline

2Bkn horizon

Hue: 5YR, 7.5YR

Value: 5 or 7, dry or moist

Chroma: 3 to 6, dry or moist

Texture: loamy sand, sandy loam, sandy clay loam

Clay: 10 to 25 percent

Reaction: moderately alkaline or strongly alkaline

Calcium carbonate equivalent: 0 to 4 percent

Rizno soils

Taxonomic classification: Loamy, mixed, superactive, nonacid, mesic Lithic Ustic
Torriorthents

Geomorphic position: occurs on stabilized sand sheets on mesa summits

Parent material: residuum weathered from mudstone and/or eolian sands derived
from sandstone

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 3 percent

bare soil: 67 percent

rock fragments

- gravel: 1 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.1 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, blue grama, broom snakeweed, galleta, longleaf Mormon tea, pricklypear and cholla
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:
 36° 41' 42.20" north, 111° 23' 16.80" west

C1—0 to 1 inch (0 to 3 cm); yellowish red (5YR 4/6) coarse sand, reddish brown (5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

C2—1 inch to 5 inches (3 to 13 cm); yellowish red (5YR 4/6) coarse sandy loam, reddish brown (5YR 4/4), moist; 8 percent clay; massive; loose, slightly sticky and nonplastic; common very fine and fine roots throughout; few very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C3—5 to 11 inches (13 to 28 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 12 percent clay; massive; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots throughout; few very fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

R—11 inches (28 cm); strongly effervescent; fractured, unweathered sandstone bedrock.

Range in Characteristics

Rizno as used in this survey is a taxadjunct to the series because it is nonacid and has up to 20 percent clay. Rizno series is a Loamy, mixed, superactive, calcareous, mesic Lithic Ustic Tororthents.

C horizons

Hue: 5YR, 7.5YR
 Value: 4 to 6, dry or moist
 Chroma: 4 or 6, dry or moist
 Texture: coarse sand, loamy sand, sandy loam, sandy clay loam
 Clay: 3 to 20 percent
 Reaction: neutral to strongly alkaline

Rock outcrop

Exposures of flat or rolling bedrock, typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

13—Gish, moderately deep-Reef complex, 1 to 35 percent slopes

Map Unit Setting

Landform(s): pediments
Elevation: 5,500 to 5,800 feet (1,676 to 1,768 meters)
Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Gish, moderately deep and similar soils: 40 percent

Reef and similar soils: 40 percent

Minor Components: 20 percent

- Mido and similar soils
- Nakai and similar soils
- Rock outcrop
- Gullied land

Soil Properties and Qualities

Gish, moderately deep soils

Taxonomic classification: Fine, mixed, superactive, mesic Ustic Haplocambids

Geomorphic position: occurs on pediments

Parent material: residuum weathered from mudstone

Slope: 20 to 25 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 8 percent

 woody debris: 2 percent

 bare soil: 90 percent

 rock fragments

- gravel: 60 percent

- cobble: 20 percent

- stone: 5 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, paralithic

Drainage class: well drained

Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)

Ksat restrictive layer: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Available water capacity total inches: 2.9 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Ephedra, broom snakeweed, shadscale saltbush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 49' 44.30" north, 110° 13' 20.50" west

A—0 to 2 inches (0 to 5 cm); reddish brown (5YR 5/4) extremely channery sandy clay loam, reddish brown (5YR 4/4), moist; 22 percent clay; weak fine granular and weak medium granular structure; soft, friable, slightly sticky and slightly plastic; few very fine and fine roots throughout; 70 percent gravel, 3 percent cobble, and 2 percent stone; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

Bw—2 to 14 inches (5 to 36 cm); reddish brown (5YR 5/3) clay, reddish brown (5YR 4/3), moist; 45 percent clay; weak coarse subangular blocky and weak medium subangular blocky structure; hard, firm, very sticky and very plastic; common very fine and fine roots throughout; few very fine and fine dendritic tubular pores; 10 percent gravel; violently effervescent; strongly alkaline, pH 9.0; clear wavy boundary.

Cn—14 to 21 inches (36 to 53 cm); reddish brown (5YR 5/3) clay, reddish brown (5YR 4/3), moist; 47 percent clay; massive; very hard, firm, moderately sticky and very plastic; few fine and medium roots throughout; few very fine and fine dendritic tubular pores; few fine faint gypsum crystals in matrix and common coarse carbonate masses in matrix; violently effervescent; very strongly alkaline, pH 9.2; clear wavy boundary.

Cr—21 to 60 inches (53 to 152 cm); fractured, weathered mudstone bedrock.

Range in Characteristics**A horizon**

Hue: 5YR, 7.5YR

Value: 5 or 6 dry, 4 or 5 moist

Chroma: 4 or 6, dry or moist

Texture: sandy loam, loam, sandy clay loam

Clay: 10 to 22 percent

Reaction: moderately alkaline or very strongly alkaline

Rock fragments: 40 to 78 percent

Bw horizon

Hue: 2.5YR, 5YR, 10YR, 2.5Y

Value: 4 to 6, dry or moist

Chroma: 2 to 6 dry, 3 to 6 moist

Texture: sandy clay loam, clay loam, clay

Clay: 30 to 55 percent

Reaction: moderately alkaline or very strongly alkaline

Cn horizon

Hue: 5YR, 10YR, 2.5Y

Value: 5 or 6 dry, 4 to 6 moist

Chroma: 3 or 4, dry or moist

Texture: sandy clay loam, clay loam, clay

Clay: 30 to 47 percent

Reaction: moderately alkaline or very strongly alkaline

Cambic horizon—the zone from 2 to 14 inches (Bw horizons)

Reef soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic

Lithic Ustic Torriorthents

Geomorphic position: occurs on pediments

Parent material: residuum weathered from mudstone

Slope: 1 to 35 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 5 percent

bare soil: 80 percent

rock fragments

- gravel: 60 percent

- cobble: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.7 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Ephedra, broom snakeweed, shadscale saltbush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 49' 31.70" north, 110° 12' 58.30" west

A—0 to 1 inch (0 to 3 cm); strong brown (7.5YR 4/6) very channery very fine sandy loam, brown (7.5YR 4/4), moist; 12 percent clay; weak very fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; few very fine roots throughout; 35 percent channer, 3 percent flagstone, and 2 percent stone; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

C1—1 inch to 3 inches (3 to 8 cm); yellowish brown (10YR 5/4) very fine sandy loam, dark yellowish brown (10YR 4/4), moist; 12 percent clay; massive; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots throughout; many very fine and common fine dendritic tubular pores; 9 percent channer and 1 percent flagstone; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

C2—3 to 7 inches (8 to 18 cm); yellowish brown (10YR 5/4) extremely gravelly very fine sandy loam, dark yellowish brown (10YR 4/4), moist; 14 percent clay; massive; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots in cracks; few fine dendritic tubular pores; 65 percent gravel, 2 percent cobble, and 3 percent stone; strongly effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—7 inches (18 cm); fractured, unweathered mudstone bedrock.

Range in Characteristics

A horizon

Hue: 5YR, 7.5YR, 10YR
 Value: 4 to 6, dry or moist
 Chroma: 3 to 6 dry, 4 or 5 moist
 Texture: sandy loam, fine sandy loam, very fine sandy loam, loam
 Clay: 8 to 20 percent
 Reaction: moderately alkaline or strongly alkaline
 Rock fragments: 35 to 55 percent

C horizons

Hue: 10YR, 2.5Y
 Value: 4 to 6, dry or moist
 Chroma: 4 or 5, dry or moist
 Texture: sandy loam, very fine sandy loam, silt loam
 Clay: 8 to 25 percent
 Reaction: moderately alkaline or strongly alkaline
 Rock fragments: 9 to 73 percent

14—Gotho-Aneth family complex, 1 to 10 percent slopes

Map Unit Setting

Landform(s): canyons
Elevation: 5,400 to 5,800 feet (1,646 to 1,768 meters)
Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Gotho and similar soils: 70 percent
 Aneth family and similar soils: 25 percent
 Minor Components: 5 percent

- Sodic soils
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Gotho soils

Taxonomic classification: Fine-loamy, mixed, superactive, calcareous, mesic Typic Torriorthents
Geomorphic position: occurs on stream terraces in canyon bottoms
Parent material: alluvium derived from sandstone and shale and/or eolian deposits derived from sandstone and shale
Slope: 1 to 3 percent
Surface cover:
 Biological crust
 cyanobacteria: 0 percent
 lichen: 0 percent

moss: 0 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 10 percent
 woody debris: 5 percent
 bare soil: 85 percent
 rock fragments: 0 percent
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Available water capacity total inches: 6.4 (moderate)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: very rare
Runoff class: negligible
Hydrologic group: C
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: greasewood
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 38' 19.90" north, 109° 58' 58.40" west

C1—0 to 1 inch (0 to 3 cm); light yellowish brown (2.5Y 6/3) loam, light olive brown (2.5Y 5/3), moist; 20 percent clay; single grain; loose, slightly sticky and very plastic; few very fine roots throughout; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C2—1 inch to 10 inches (3 to 25 cm); light yellowish brown (2.5Y 6/3) sand, olive brown (2.5Y 4/3), moist; 3 percent clay; moderate medium platy structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots throughout; common very fine and few fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.2; very abrupt smooth boundary.

Ab—10 to 12 inches (25 to 30 cm); light yellowish brown (2.5Y 6/4) sandy loam, olive brown (2.5Y 4/3), moist; 15 percent clay; weak thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; common very fine dendritic tubular pores; common fine carbonate masses along faces of peds; violently effervescent; moderately alkaline, pH 8.0; very abrupt smooth boundary.

2C1—12 to 27 inches (30 to 69 cm); grayish brown (2.5Y 5/2) silty clay, olive brown (2.5Y 4/3), moist; 45 percent clay; moderate very coarse prismatic parting to weak very thick platy structure; hard, firm, slightly sticky and very plastic; many very fine roots, and few fine, medium, and very coarse roots throughout; common very fine and fine dendritic tubular pores; many fine carbonate masses along faces of peds; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

2C2—27 to 40 inches (69 to 102 cm); light olive brown (2.5Y 5/3) sandy loam, olive brown (2.5Y 4/4), moist; 15 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine, medium, and coarse roots throughout; few very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

2Ab—40 to 44 inches (102 to 112 cm); grayish brown (2.5Y 5/2) clay, olive brown (2.5Y 4/3), moist; 55 percent clay; weak thick platy structure; slightly hard, very friable, slightly sticky and very plastic; many very fine, and few fine and medium roots throughout; common very fine and few fine and medium dendritic tubular pores; many fine carbonate masses along faces of peds; violently effervescent; moderately alkaline, pH 8.4; very abrupt wavy boundary.

6C1—44 to 52 inches (112 to 132 cm); light olive brown (2.5Y 5/3) sand, olive brown (2.5Y 4/3), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; few very fine and fine dendritic tubular pores; common fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

6C2—52 to 60 inches (132 to 152 cm); light yellowish brown (2.5Y 6/3) coarse sand, light olive brown (2.5Y 5/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; few fine and medium dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

C1 horizon

Hue: 10YR, 2.5Y

Value: 5 or 6, dry or moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, loam, sandy clay loam, clay loam, clay

Clay: 10 to 45 percent

Reaction: moderately alkaline to very strongly alkaline

Ab and 2Ab horizons

Hue: 10YR, 2.5Y

Value: 4 to 6, dry or moist

Chroma: 2 to 6 dry, 3 or 4 moist

Texture: sand, loamy sand, sandy loam, silty clay, clay

Clay: 3 to 60 percent

Reaction: moderately alkaline or strongly alkaline

C2, 2C1, 2C2, 6C1, and 6C2 horizons

Hue: 10YR, 2.5Y

Value: 4 to 6, dry or moist

Chroma: 2 to 6, dry or moist

Texture: sand, coarse sand, loamy sand, sandy loam, silty clay, clay

Clay: 2 to 62 percent

Reaction: moderately alkaline or strongly alkaline

Aneth family soils

Taxonomic classification: Sandy, mixed, mesic Typic Torriorthents

Geomorphic position: occurs on stream terraces on canyon bottoms

Parent material: alluvium derived from sandstone and shale and/or eolian deposits derived from sandstone and shale

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent
 Physical cover
 canopy plant cover: 5 percent
 woody debris: 0 percent
 bare soil: 95 percent
 rock fragments: 0 percent
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Available water capacity total inches: 5.4 (moderate)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: very rare
Runoff class: negligible
Hydrologic group: C
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: fourwing saltbush, greasewood
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:
 36° 35' 22.10" north, 109° 52' 10.00" west

A—0 to 2 inches (0 to 5 cm); pale brown (10YR 6/3) clay, brown (10YR 4/3), moist; 40 percent clay; weak medium granular and moderate thick platy structure; soft, very friable, moderately sticky and very plastic; few very fine, fine, and medium roots throughout; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C1—2 to 4 inches (5 to 10 cm); light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2), moist; 30 percent clay; moderate thin platy structure; slightly hard, very friable, slightly sticky and very plastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—4 to 9 inches (10 to 23 cm); grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2), moist; 45 percent clay; moderate thick platy parting to weak medium subangular blocky structure; slightly hard, very friable, moderately sticky and very plastic; common very fine and few fine roots throughout; few very fine dendritic tubular pores; common medium carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C3—9 to 13 inches (23 to 33 cm); brown (7.5YR 5/3) stratified sand to fine sand to fine sandy loam, brown (7.5YR 4/3), moist; 15 percent clay; massive; slightly hard, very friable, slightly sticky and moderately plastic; few very fine and fine roots throughout; few very fine, fine, and coarse dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.2; very abrupt smooth boundary.

2Ab—13 to 14 inches (33 to 36 cm); grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2), moist; 30 percent clay; weak thick platy structure; slightly hard, very friable, slightly sticky and very plastic; few very fine roots throughout; few very fine dendritic tubular pores; common medium carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

2C—14 to 23 inches (36 to 58 cm); light brown (7.5YR 6/3) stratified sand to fine sand to loamy sand, brown (7.5YR 4/3), moist; 5 percent clay; massive; soft, very

friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine, fine, and medium dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.0; very abrupt smooth boundary.

2A'b—23 to 24 inches (58 to 61 cm); light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2), moist; 25 percent clay; weak thick platy structure; hard, very friable, moderately sticky; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; common medium carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

2C'—24 to 34 inches (61 to 86 cm); pale brown (10YR 6/3) stratified sand to fine sand to loamy sand, brown (10YR 4/3), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine and fine dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.0; very abrupt smooth boundary.

3C—34 to 60 inches (86 to 152 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; noneffervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Aneth family differs from the series because the series does not have clay or clay loam surface textures and has hues of 5YR and 2.5YR.

A horizon

Hue: 10YR, 2.5Y
Value: 5 or 6 dry, 4 to 6 moist
Chroma: 3 to 6, dry or moist
Texture: clay, sandy clay
Clay: 35 to 50 percent
Reaction: moderately alkaline or strongly alkaline

C1, C2, C3, 2C, 2C', and 3C horizons

Hue: 7.5YR, 10YR, 2.5Y
Value: 4 to 6, dry or moist
Chroma: 3 to 8, dry or moist
Texture: sand, fine sand, loamy sand, sandy loam, fine sandy loam, clay loam, sandy clay, silty clay, clay
Clay: 2 to 55 percent
Reaction: moderately alkaline or strongly alkaline

2Ab and 2Ab' horizons

Hue: 10YR, 2.5Y
Value: 5 or 6 dry, 4 to 6 moist
Chroma: 2 to 4 dry, 2 to 4 moist
Texture: sandy loam, loam, clay loam, clay
Clay: 15 to 50
Reaction: moderately alkaline or strongly alkaline

15—Jaconita-Anasazi association, 2 to 20 percent slopes

Map Unit Setting

Landform(s): fan remnants, pediments

Elevation: 5,500 to 6,500 feet (1,676 to 1,981 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Jaconita and similar soils: 70 percent

Anasazi and similar soils: 25 percent

Minor Components: 5 percent

- Pocum and similar soils
- Rock outcrop
- Gullied land

Soil Properties and Qualities

Jaconita soils

Taxonomic classification: Sandy-skeletal, mixed, mesic Ustic Haplocalcids

Geomorphic position: occurs on fan remnants

Parent material: alluvium derived from limestone and sandstone and/or colluvium
derived from limestone and sandstone

Slope: 4 to 20 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 5 percent

bare soil: 35 percent

rock fragments

- gravel: 30 percent

- cobble: 10 percent

Drainage class: somewhat poorly drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Available water capacity total inches: 4.6 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, blackbrush, Mormon tea

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 59' 10.30" north, 110° 53' 14.00" west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) very gravelly fine sand, yellowish

red (5YR 4/6), moist; 5 percent clay; weak medium granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; common medium carbonate nodules in matrix; 35 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Bk1—1 inch to 7 inches (3 to 18 cm); yellowish red (5YR 5/6) gravelly sandy clay loam, yellowish red (5YR 4/6), moist; 20 percent clay; weak fine subangular blocky structure; soft, very friable, slightly sticky and moderately plastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; common fine carbonate masses in matrix; 25 percent gravel; violently effervescent, 20 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; gradual smooth boundary.

Bk2—7 to 16 inches (18 to 41 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 7 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; common medium carbonate nodules in matrix; 5 percent gravel; violently effervescent, 12 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear smooth boundary.

Bk3—16 to 60 inches (41 to 152 cm); pink (5YR 7/3) very cobbly loamy fine sand, yellowish red (5YR 5/6), moist; 10 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; many coarse carbonate nodules in matrix; 15 percent gravel, 15 percent cobble, and 15 percent stone; violently effervescent, 16 percent calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Textures: loamy sand, fine sand, loamy fine sand

Clay: 5 to 15 percent

Bk1 horizon

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sandy loam, fine sandy loam, sandy clay loam

Clay: 12 to 25 percent

Reaction: moderately alkaline or strongly alkaline

Calcium carbonate equivalent: 15 to 30 percent

Bk2 and Bk3 horizons

Hue: 7.5YR, 5YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: loamy fine sand, fine sandy loam, loamy sand

Clay: 8 to 12 percent

Reaction: moderately alkaline or strongly alkaline

Calcium carbonate equivalent: 5 to 20 percent

Calcic horizon—the zone from 1 to 60 inches (Bk horizons)

Anasazi soils

Taxonomic classification: Sandy, mixed, mesic Lithic Ustic Haplocalcids

Geomorphic position: occurs on pediments

Parent material: residuum weathered from limestone and sandstone

Slope: 2 to 20 percent

Surface cover:

Biological crust

cyanobacteria: 5 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 5 percent

bare soil: 20 percent

rock fragments

- gravel: 35 percent

- cobble: 10 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic; 5 to 20 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Available water capacity total inches: 1.4 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Ephedra, Utah juniper, blackbrush, broom snakeweed, pinyon, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 59' 37.20" north, 110° 53' 29.50" west

C—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) very gravelly loamy fine sand, reddish brown (5YR 4/4), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; common medium carbonate nodules in matrix; 35 percent gravel; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Bk1—1 inch to 4 inches (3 to 10 cm); yellowish red (5YR 4/6) fine sandy loam, reddish brown (5YR 4/4), moist; 15 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots throughout; few very fine and fine dendritic tubular pores; common fine carbonate masses and medium carbonate nodules in matrix; 10 percent gravel; violently effervescent, 7 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; gradual smooth boundary.

Bk2—4 to 9 inches (10 to 23 cm); light reddish brown (5YR 6/4) gravelly loamy fine sand, reddish brown (5YR 5/4), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots throughout; few very fine dendritic tubular pores; common medium carbonate masses

in matrix; 15 percent gravel; violently effervescent, 34 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

Bk3—9 to 17 inches (23 to 43 cm); light reddish brown (5YR 6/4) gravelly loamy fine sand, light reddish brown (5YR 6/4), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine dendritic tubular pores; common medium carbonate masses in matrix; 15 percent gravel; violently effervescent, 18 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear irregular boundary.

Cr—17 to 19 inches (43 to 48 cm); fractured, weathered sandstone bedrock.

R—19 inches (48 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

Anasazi as used in this survey is a taxadjunct to the official series because the lithic contact is less than 20 inches deep and the particle-size control section is sandy. Anasazi series classifies as a Coarse-loamy, mixed, superactive, mesic Ustic Haplocalcids.

C horizon

Hue: 5YR, 7.5YR
Value: 4 to 6, dry or moist
Chroma: 4 or 6, dry or moist
Texture: sand, fine sand, loamy fine sand
Clay: 2 to 10 percent
Reaction: moderately alkaline or strongly alkaline

Bk1 horizon

Hue: 5YR, 7.5YR
Value: 4 to 6, dry or moist
Chroma: 4 or 6, dry or moist
Texture: fine sandy loam, sandy loam
Clay: 10 to 18 percent
Reaction: moderately alkaline or strongly alkaline
Calcium carbonate equivalent: 5 to 20 percent

Bk2 and Bk3 horizons

Hue: 7.5YR, 5YR
Value: 4 to 6, dry or moist
Chroma: 4 or 6, dry or moist
Texture: loamy fine sand, loamy sand
Clay: 5 to 10 percent
Reaction: moderately alkaline or strongly alkaline
Calcium carbonate equivalent: 15 to 40 percent

Calcic horizon—the zone from 1 to 17 inches (Bk horizons)

16—Lithic Haplogypsids-Typic Haplogypsids complex, 2 to 12 percent slopes

Map Unit Setting

Landform(s): fan remnants

Elevation: 4,800 to 5,100 feet (1,463 to 1,554 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Lithic Haplogypsid and similar soils: 60 percent

Typic Haplogypsid and similar soils: 30 percent

Minor Components: 10 percent

- Lithic Torriorthents
- Gullied land

Soil Properties and Qualities

Lithic Haplogypsid soils

Taxonomic classification: Lithic Haplogypsid

Geomorphic position: occurs on erosional surfaces on fan remnants

Parent material: eolian sands derived from sandstone over residuum weathered from rock gypsum

Slope: 3 to 12 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 5 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 4 percent

woody debris: 1 percent

bare soil: 95 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic; 5 to 20 inches to bedrock, paralithic

Drainage class: well drained

Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)

Available water capacity total inches: 1.3 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Ephedra, fourwing saltbush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 57' 44.90" north, 109° 57' 22.80" west

A—0 to 1 inch (0 to 3 cm); reddish brown (2.5YR 5/4) sandy loam, dark reddish

brown (2.5YR 3/4), moist; 17 percent clay; weak coarse platy structure; soft, very friable, slightly sticky and slightly plastic; common very fine and coarse roots throughout; slightly effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Byz—1 inch to 8 inches (3 to 20 cm); 25 percent pink (2.5YR 8/3) and 75 percent reddish brown (2.5YR 4/4) sandy clay loam, reddish brown (2.5YR 4/4), moist; 26 percent clay; moderate medium subangular blocky structure; slightly hard, very friable, moderately sticky and moderately plastic; common very fine and coarse roots throughout; common fine prominent salt masses in matrix and common fine gypsum masses in matrix; slightly effervescent, 20 percent gypsum; slightly alkaline, pH 7.6; clear wavy boundary.

Cr—8 to 11 inches (20 to 28 cm); fractured, weathered sandstone and mudstone bedrock.

R—11 inches (28 cm); unfractured, unweathered sandstone and mudstone bedrock.

Range in Characteristics

Lithic Haplogypsids have soil properties that vary outside of family class limits.

A horizon

Hue: 2.5YR, 5YR
Value: 4 to 6 dry, 3 or 4 moist
Chroma: 4 to 8, dry or moist
Clay: 4 to 17 percent
Reaction: slightly alkaline or moderately alkaline
Gypsum: 5 to 40 percent

Byz horizon

Hue: 2.5YR, 5YR
Value: 4 to 8 dry, 3 or 4 moist
Chroma: 3 to 8, dry or moist
Clay: 4 to 26 percent
Reaction: slightly alkaline or moderately alkaline
Gypsum: 5 to 40 percent

Gypsic horizon—the zone from 1 to 8 inches (Byz horizon)

Some pedons do not have an A horizon.

Typic Haplogypsids soils

Taxonomic classification: Typic Haplogypsids

Geomorphic position: occurs on erosional surfaces on fan remnants

Parent material: eolian sands derived from sandstone over residuum weathered from rock gypsum

Slope: 2 to 3 percent

Surface cover:

Biological crust

cryptobiotic: 10 percent
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 3 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 5 percent
woody debris: 0 percent

bare soil: 95 percent

rock fragments

- gravel: 5 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.8 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Ephedra, yucca, fourwing saltbush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 57' 58.90" north, 109° 58' 17.80" west

A—0 to 2 inches (0 to 5 cm); reddish yellow (5YR 6/8) loamy very fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; weak coarse platy structure; soft, very friable, nonsticky and nonplastic; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

By—2 to 16 inches (5 to 41 cm); 10 percent pinkish white (5YR 8/2) and 90 percent yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 10 percent clay; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and medium roots throughout; common fine prominent gypsum masses in matrix; strongly effervescent, 20 percent gypsum; moderately alkaline, pH 8.0; clear smooth boundary.

C—16 to 24 inches (41 to 61 cm); yellowish red (5YR 5/6) loamy very fine sand, yellowish red (5YR 4/6), moist; 9 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and medium roots throughout; violently effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—24 inches (61 cm); fractured, unweathered sandstone and mudstone bedrock.

Range in Characteristics

Typic Haplogypsiids have soil properties that vary outside of family class limits.

A horizon

Hue: 2.5YR, 5YR

Value: 4 to 6, dry or moist

Chroma: 6 or 8, dry or moist

Texture: loamy sand, loamy very fine sand

Clay: 4 to 6 percent

Reaction: moderately alkaline or strongly alkaline

By horizon

Value: 4 to 8 dry

Chroma: 2 to 8, dry or moist

Texture: loamy sand, loamy fine sand

Clay: 5 to 10 percent
 Reaction: moderately alkaline or strongly alkaline
 Gypsum: 5 to 15 percent

C horizon

Hue: 2.5YR, 5YR
 Value: 4 to 6 dry
 Chroma: 6 or 8, dry or moist
 Texture: loamy sand, loamy very fine sand, loamy fine sand
 Clay: 4 to 9 percent
 Reaction: moderately alkaline or strongly alkaline

Gypsic horizon—the zone from 2 to 16 inches (By horizon)

Some pedons do not have an A horizon.

17—Lybrook-Tsosie complex, 0 to 8 percent slopes

Map Unit Setting

Landform(s): fan remnants
Elevation: 5,980 to 6,470 feet (1,822 to 1,973 meters)
Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)
Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Lybrook and similar soils: 60 percent
 Tsosie and similar soils: 20 percent
 Minor Components: 20 percent

- Rehobeth and similar soils
- Ustic Torrifluvents

Soil Properties and Qualities

Lybrook soils

Taxonomic classification: Fine, mixed, superactive, calcareous, mesic Ustic Torriorthents

Geomorphic position: occurs on stream terraces on fan remnants

Parent material: alluvium derived from sandstone and shale

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 60 percent

woody debris: 5 percent

bare soil: 40 percent
 rock fragments: 0 percent
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Available water capacity total inches: 12.0 (very high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: negligible
Hydrologic group: C
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: buckwheat, galleta, greasewood, sixweeks fescue, western wheatgrass
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 36' 32.00" north, 110° 28' 32.00" west

A—0 to 3 inches (0 to 8 cm); light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (2.5Y 4/2), moist; 35 percent clay; weak fine platy structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine roots throughout; strongly effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

C1—3 to 13 inches (8 to 33 cm); grayish brown (2.5Y 5/2) stratified fine sand to silty clay loam, olive brown (2.5Y 4/3), moist; 36 percent clay; massive; very hard, firm, moderately sticky and moderately plastic; common very fine, fine, and medium roots throughout; many very fine dendritic tubular pores; common fine carbonate masses lining pores; strongly effervescent; strongly alkaline, pH 8.6; abrupt wavy boundary.

C2—13 to 22 inches (33 to 56 cm); 10 percent strong brown (7.5YR 5/6) and 90 percent grayish brown (2.5Y 5/2) stratified loam to silty clay loam, 10 percent brown (7.5YR 4/4) and 90 percent dark grayish brown (2.5Y 4/2), moist; 38 percent clay; massive; very hard, firm, moderately sticky and moderately plastic; common very fine and few medium roots throughout; many very fine dendritic tubular pores; common fine carbonate masses on surfaces along pores; strongly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

C3—22 to 51 inches (56 to 130 cm); grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2), moist; 40 percent clay; massive; very hard, firm, moderately sticky and moderately plastic; common very fine roots throughout; common very fine dendritic tubular pores; common fine carbonate masses lining pores; strongly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

C4—51 to 63 inches (130 to 160 cm); grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2), moist; 32 percent clay; massive; slightly hard, friable, moderately sticky and very plastic; few very fine roots throughout; few very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

A horizon

Hue: 10YR, 2.5Y

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 2 or 3, dry or moist

Texture: fine sandy loam, sandy loam, loam, silt loam, silty clay loam, clay loam
 Clay: 18 to 38 percent
 Reaction: moderately alkaline or strongly alkaline

C horizons

Hue: 10YR, 2.5Y
 Value: 4 to 6 dry, 3 or 5 moist
 Chroma: 2 to 4, dry or moist
 Texture: fine sandy loam, sandy clay loam, loam, silt loam, silty clay loam, clay loam
 Clay: 18 to 40 percent
 Reaction: moderately alkaline or strongly alkaline

Tsosié soils

Taxonomic classification: Fine-loamy, mixed, superactive, calcareous, mesic Ustic Torriorthents

Geomorphic position: occurs on stream terraces on fan remnants

Parent material: alluvium derived from sandstone and shale

Slope: 2 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 60 percent
 woody debris: 5 percent
 bare soil: 40 percent
 rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Available water capacity total inches: 10.1 (very high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: high

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: alkali sacaton, broom snakeweed, greasewood, shadscale saltbush, sixweeks fescue

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 34' 57.70" north, 110° 28' 30.70" west

A—0 to 3 inches (0 to 8 cm); grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2), moist; 38 percent clay; weak fine granular structure; soft, very friable, very sticky and moderately plastic; many very fine, and few medium roots throughout; common very fine vesicular pores; violently effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

C1—3 to 10 inches (8 to 25 cm); grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2), moist; 35 percent clay; massive; soft, very friable, very sticky and moderately plastic; common very fine and few coarse roots throughout; common fine dendritic tubular pores; common fine carbonate masses lining pores; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

C2—10 to 31 inches (25 to 79 cm); pale brown (10YR 6/3) silt loam, brown (10YR 5/3), moist; 27 percent clay; massive; slightly hard, friable, very sticky and moderately plastic; common very fine and fine and few coarse roots throughout; common fine dendritic tubular pores; common fine carbonate masses lining pores; violently effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

C3—31 to 38 inches (79 to 96 cm); light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2), moist; 28 percent clay; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine and few medium roots throughout; common very fine dendritic tubular pores; common fine carbonate masses lining pores; violently effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

2C4—38 to 52 inches (96 to 132 cm); pale brown (10YR 6/3) stratified coarse sand to sandy loam, brown (10YR 5/3), moist; 18 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; 10 percent gravel; violently effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

2C5—52 to 62 inches (132 to 157 cm); pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3), moist; 28 percent clay; massive; moderately hard, firm, slightly sticky and slightly plastic; few very fine roots throughout; common very fine dendritic tubular pores; violently effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

A horizon

Hue: 10YR, 2.5Y

Chroma: 2 or 3, dry or moist

Texture: fine sandy loam, sandy loam, silt loam, silty clay loam, clay loam

Clay: 18 to 38 percent

Reaction: moderately alkaline or strongly alkaline

C horizons

Hue: 10YR, 2.5Y

Value: 4 to 6 dry, 4 or 5 moist

Chroma: 2 to 4, dry or moist

Texture: coarse sand, sandy loam, fine sandy loam, sandy clay loam, silt loam, silty clay loam, clay loam

Clay: 18 to 34 percent

Reaction: moderately alkaline or strongly alkaline

18—Marcou-Sheppard complex, 1 to 15 percent slopes

Map Unit Setting

Landform(s): dune fields

Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Marcou and similar soils: 70 percent

Sheppard and similar soils: 20 percent

Minor Components: 10 percent

- Lithic Torriorthents
- Rock outcrop
- Active dunes and sand sheets

Soil Properties and Qualities

Marcou soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, mesic Typic Torriorthents

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands over residuum weathered from calcareous sandstone

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 5 percent

woody debris: 2 percent

bare soil: 93 percent

rock fragments: 0 percent

Drainage class: somewhat excessively drained

Ksat solum: 0.57 to 19.98 inches per hour (4.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.1 (low)

Shrink-swell potential: about 2.0 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: longleaf Mormon tea

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 55' 39.80" north, 110° 16' 12.80" west

C1—0 to 2 inches (0 to 5 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; very slightly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—2 to 12 inches (5 to 30 cm); yellowish red (5YR 5/8) sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few

very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C3—12 to 18 inches (30 to 46 cm); yellowish red (5YR 5/8) loamy sand, yellowish red (5YR 4/6), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine, fine, and medium dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C4—18 to 38 inches (46 to 97 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 10 percent clay; weak coarse angular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; gradual irregular boundary.

C5—38 to 45 inches (97 to 114 cm); white (10YR 8/1) coarse sandy loam, very pale brown (10YR 7/3), moist; 12 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; common fine vesicular pores; violently effervescent; strongly alkaline, pH 8.6; clear irregular boundary.

Cn—45 to 60 inches (114 to 152 cm); very pale brown (10YR 7/3) loamy coarse sand, light yellowish brown (10YR 6/4), moist; 10 percent clay; massive; very hard, firm, slightly sticky and nonplastic; few very fine vesicular pores; violently effervescent; strongly alkaline, pH 8.8.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 8 dry, 3 to 6 moist

Chroma: 4 to 8, dry or moist

Texture: sand, loamy sand, sandy loam, loam, loamy fine sand

Clay: 2 to 22 percent

Reaction: moderately alkaline to very strongly alkaline

Cn horizon

Hue: 10YR, 7.5YR

Value: 7 or 8 dry, 6 or 7 moist

Chroma: 1 to 3 dry, 1 to 4 moist

Texture: coarse sandy loam, loamy coarse sand, sandy clay loam, sandy loam

Clay: 8 to 35 percent

Reaction: moderately alkaline to very strongly alkaline

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on stabilized dunes in dune fields

Parent material: eolian sands

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 5 percent

woody debris: 2 percent
 bare soil: 93 percent
 rock fragments: 0 percent
Drainage class: excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Available water capacity total inches: 4.2 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: negligible
Hydrologic group: A
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: longleaf Mormon tea, prickly Russian thistle, sage
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 54' 31.10" north, 110° 15' 56.80" west

C1—0 to 1 inch (0 to 3 cm); reddish yellow (5YR 6/6) sand, yellowish red (5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—1 inch to 23 inches (3 to 58 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular and few fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C3—23 to 60 inches (58 to 152 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots throughout; few very fine and fine dendritic tubular pores; very slightly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

C horizons

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy sand

Clay: 2 to 4 percent

Reaction: slightly alkaline or moderately alkaline

19—Marcou-Sheppard-Typic Natrargids complex, 1 to 10 percent slopes

Map Unit Setting

Landform(s): dune fields, pediments

Elevation: 5,020 to 5,680 feet (1,530 to 1,733 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Marcou and similar soils: 30 percent

Sheppard and similar soils: 30 percent

Typic Natrargids and similar soils: 30 percent

Minor Components: 10 percent

- Typic Haplocalcids
- Typic Torrifluvents
- Riverwash
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Marcou soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, mesic Typic Torriorthents

Geomorphic position: occurs on sand sheets and stabilized dunes

Parent material: eolian sands

Slope: 1 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 15 percent

woody debris: 0 percent

bare soil: 85 percent

rock fragments: 0 percent

Drainage class: somewhat excessively drained

Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)

Available water capacity total inches: 7.2 (high)

Shrink-swell potential: about 4.0 LEP (moderate)

Flooding hazard: none

Runoff class: negligible

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, yucca, blackbrush, galleta, longleaf Mormon tea, prickly Russian thistle, pricklypear and cholla

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 52' 53.20" north, 110° 16' 6.30" west

C1—0 to 1 inch (0 to 3 cm); reddish yellow (5YR 6/8) sand, yellowish red (5YR 5/8),

moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C2—1 inch to 23 inches (3 to 58 cm); reddish yellow (5YR 6/8) sand, yellowish red (5YR 5/8), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; gradual smooth boundary.

C3—23 to 32 inches (58 to 81 cm); reddish yellow (5YR 6/8) sandy loam, yellowish red (5YR 5/8), moist; 18 percent clay; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots throughout; common very fine and few fine and medium dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

2Btkb—32 to 42 inches (81 to 107 cm); light reddish brown (5YR 6/4) clay loam, reddish brown (5YR 5/4), moist; 34 percent clay; weak coarse angular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine, fine, and medium roots throughout; many very fine, common fine and few medium dendritic tubular pores; very few faint clay bridges between sand grains; common fine carbonate masses in matrix; violently effervescent, 17 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; gradual wavy boundary.

2Bkb—42 to 54 inches (107 to 137 cm); reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6), moist; 24 percent clay; massive; hard, friable, moderately sticky and moderately plastic; few very fine, fine, and medium roots throughout; few fine and medium dendritic tubular pores; common fine carbonate masses in matrix; violently effervescent, 17 percent calcium carbonate equivalent; strongly alkaline, pH 8.8; gradual wavy boundary.

2C—54 to 60 inches (137 to 152 cm); pink (5YR 8/3) sandy loam, pink (5YR 7/3), moist; 12 percent clay; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots throughout; few fine and medium dendritic tubular pores; violently effervescent; strongly alkaline, pH 9.0.

Range in Characteristics

C horizons

Value: 5 or 6 dry, 4 or 5 moist.

Chroma: 4 to 8, dry or moist

Texture: sand, sandy loam

Clay: 2 to 10 percent

Reaction: slightly alkaline or moderately alkaline

2Btkb and 2Bkb horizons

Hue: 5YR, 2.5YR

Value: 6 or 7 dry, 5 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: clay loam, sandy clay loam, sandy loam

Clay: 18 to 35 percent

Reaction: moderately alkaline or strongly alkaline

Calcium carbonate equivalent: 5 to 25 percent

2C horizon

Value: 5 to 8, dry or moist

Chroma: 3 to 6, dry or moist

Clay: 10 to 18 percent

Some pedons do not have a 2C horizon.

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on stabilized dunes in dune fields

Parent material: eolian sands

Slope: 1 to 10 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 20 percent

 woody debris: 3 percent

 bare soil: 77 percent

 rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: yucca, blackbrush, longleaf Mormon tea

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 54' 34.20" north, 110° 18' 41.30" west

C1—0 to 1 inch (0 to 3 cm); reddish yellow (5YR 6/6) sand, yellowish red (5YR 5/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots throughout; violently effervescent; moderately alkaline, pH 8.2; gradual smooth boundary.

C2—1 inch to 18 inches (3 to 46 cm); reddish yellow (5YR 6/6) sand, yellowish red (5YR 5/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; gradual smooth boundary.

C3—18 to 36 inches (46 to 91 cm); reddish yellow (5YR 6/6) sand, yellowish red (5YR 5/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

C4—36 to 60 inches (91 to 152 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic;

common fine and medium roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizons

Value: 5 or 6 dry, 4 or 5 moist
 Chroma: 4 or 6, dry or moist
 Texture: sand, loamy sand
 Clay: 2 to 8 percent
 Reaction: moderately alkaline or strongly alkaline

Typic Natrargids soils

Taxonomic classification: Typic Natrargids

Geomorphic position: occurs on pediments

Parent material: residuum weathered from mudstone

Slope: 1 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 1 percent
 woody debris: 1 percent
 bare soil: 68 percent
 rock fragments
 • gravel: 30 percent
 • cobble: 2 percent

Drainage class: well drained

Ksat solum: 0.06 to 19.98 inches per hour (0.42 to 141.00 micrometers per second)

Available water capacity total inches: 8.9 (high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: broom snakeweed

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 54' 49.00" north, 110° 19' 3.80" west

A—0 to 1 inch (0 to 3 cm); reddish yellow (5YR 6/6) gravelly sand, reddish brown (5YR 4/4), moist; 3 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; few fine roots throughout; many very fine irregular pores; 30 percent gravel; violently effervescent; strongly alkaline, pH 8.6; abrupt wavy boundary.

B_{tn}—1 inch to 2 inches (3 to 5 cm); reddish brown (2.5YR 5/4) sandy clay, reddish brown (2.5YR 4/4), moist; 38 percent clay; strong medium prismatic and strong fine

prismatic structure; hard, friable, very sticky and moderately plastic; common very fine roots throughout; common very fine and few fine dendritic tubular pores; few distinct clay films on all faces of peds and common distinct clay bridges between sand grains; 5 percent gravel; violently effervescent; strongly alkaline, pH 9.0; abrupt wavy boundary.

Btkn1—2 to 7 inches (5 to 18 cm); reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4), moist; 42 percent clay; strong fine prismatic and strong medium prismatic structure; hard, friable, very sticky and very plastic; common very fine roots throughout; common very fine and fine dendritic tubular pores; common distinct clay films on all faces of peds; many medium carbonate masses in matrix; 5 percent gravel; strongly effervescent, 14 percent calcium carbonate equivalent; very strongly alkaline, pH 9.2; abrupt wavy boundary.

Btkn2—7 to 12 inches (18 to 30 cm); 30 percent brown (7.5YR 5/4) and 70 percent yellowish red (5YR 4/6) sandy clay, 30 percent brown (7.5YR 4/4) and 70 percent reddish brown (5YR 4/4), moist; 42 percent clay; strong medium prismatic and strong coarse prismatic structure; hard, friable, very sticky and moderately plastic; common very fine roots throughout; few fine dendritic tubular pores; common distinct clay bridges between sand grains; many medium carbonate masses in matrix; 5 percent gravel; strongly effervescent, 14 percent calcium carbonate equivalent; very strongly alkaline, pH 9.4; clear wavy boundary.

Bkn—12 to 60 inches (30 to 152 cm); 35 percent yellowish red (5YR 5/6) and 65 percent brown (7.5YR 5/4) gravelly sandy clay, 35 percent reddish brown (5YR 4/4) and 65 percent brown (7.5YR 4/4), moist; 38 percent clay; weak medium prismatic and weak fine prismatic structure; hard, friable, moderately sticky and slightly plastic; common very fine and fine roots throughout; few very fine and fine irregular, and few fine dendritic tubular pores; many medium carbonate masses in matrix; 15 percent gravel; violently effervescent, 15 percent calcium carbonate equivalent; very strongly alkaline, pH 9.4; clear irregular boundary.

Range in Characteristics

Typic Natrargids have soil properties that vary outside of family class limits.

A horizon

Value: 5 or 6 dry, 4 or 5 moist
 Chroma: 4 or 6, dry or moist
 Texture: sand, sandy loam
 Clay: 2 to 10 percent
 Reaction: moderately alkaline or strongly alkaline

Btn horizon

Hue: 2.5YR, 5YR
 Value: 5 or 6 dry, 4 or 5 moist
 Chroma: 4 or 6, dry or moist
 Texture: sandy clay, sandy clay loam
 Clay: 40 to 50 percent
 Reaction: strongly alkaline or very strongly alkaline
 Calcium carbonate equivalent: less than 12 percent

Btkn and Bkn horizons

Hue: 2.5YR, 5YR, 7.5YR
 Value: 4 to 6 dry, 4 or 5 moist
 Chroma: 4 or 6, dry or moist
 Texture: sandy clay, sandy clay loam, clay
 Clay: 35 to 50 percent

Reaction: strongly alkaline or very strongly alkaline

Calcium carbonate equivalent: 5 to 15 percent

Natric horizon—the zone from 1 to 12 inches (Btn and Btn horizons)

Argillic horizon—the zone from 1 to 12 inches (Btn and Btn horizons)

Bkn horizons are not present in all pedons.

20—Mespun-Bispen-Rock outcrop complex, moist, 1 to 15 percent slopes

Map Unit Setting

Landform(s): dune fields

Elevation: 5,900 to 7,000 feet (1,798 to 2,134 meters)

Mean annual precipitation: 12 to 14 inches (305 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Mespun and similar soils: 40 percent

Bispen and similar soils: 25 percent

Rock outcrop: 25 percent

Minor Components: 10 percent

- Nalcase and similar soils
- Santrick and similar soils
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Mespun soils

Taxonomic classification: Siliceous, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: alluvium derived from sandstone and/or eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 1 to 10 percent

Surface cover:

Biological crust

cyanobacteria: less than 1 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 5 percent

bare soil: 60 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.0 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z.

Ecological site number: R035XC315AZ

Present vegetation: Wyoming big sagebrush, blue grama, broom snakeweed, pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 34' 32.30" north, 110° 32' 26.10" west

C1—0 to 4 inches (0 to 10 cm); strong brown (7.5YR 5/6) sand, dark brown (7.5YR 3/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots throughout; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

C2—4 to 21 inches (10 to 53 cm); strong brown (7.5YR 4/6) loamy sand, dark brown (7.5YR 3/4), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine tubular and few fine tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear irregular boundary.

C3—21 to 37 inches (53 to 94 cm); strong brown (7.5YR 5/6) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium, coarse, and very coarse roots throughout; few very fine and fine tubular pores; strongly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C4—37 to 60 inches (94 to 152 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine tubular pores; strongly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 to 8, dry or moist

Texture: sand, fine sand, very fine sand, loamy sand, loamy fine sand

Clay: 1 to 10 percent

Reaction: neutral to moderately alkaline

Bispen soils

Taxonomic classification: Siliceous, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: alluvium derived from sandstone and/or eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 2 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent
 moss: 0 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 60 percent
 woody debris: 0 percent
 bare soil: 40 percent
 rock fragments: 0 percent
Depth to restrictive feature(s): 40 to 60 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 3.8 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: low
Hydrologic group: A
Ecological site name: Sandy Upland 10-14" p.z.
Ecological site number: R035XC315AZ
Present vegetation: Wyoming big sagebrush, blue grama, broom snakeweed
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 34' 29.70" north, 110° 32' 42.20" west

C1—0 to 3 inches (0 to 7 cm); brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

C2—3 to 17 inches (7 to 43 cm); reddish brown (5YR 5/4) sand, reddish brown (5YR 4/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; gradual wavy boundary.

C3—17 to 42 inches (43 to 107 cm); yellowish red (5YR 5/6) fine sand, reddish brown (5YR 4/4), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C4—42 to 49 inches (107 to 124 cm); yellowish red (5YR 4/6) fine sandy loam, reddish brown (5YR 4/4), moist; 15 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; few fine and medium roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—49 inches (124 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 to 8, dry or moist

Texture: sand, fine sand, loamy fine sand, fine sandy loam

Clay: 1 to 18 percent

Reaction: neutral to moderately alkaline

Rock outcrop

Exposures of flat or rolling bedrock, typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

21—Mespun-Nalcase-Bispen complex, 0 to 10 percent slopes

Map Unit Setting

Landform(s): dune fields

Elevation: 5,600 to 6,500 feet (1,707 to 1,981 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Mespun and similar soils: 35 percent

Nalcase and similar soils: 35 percent

Bispen and similar soils: 25 percent

Minor Components: 5 percent

- Rock outcrop
- Active dunes and sand sheets

Soil Properties and Qualities

Mespun soils

Taxonomic classification: Siliceous, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone

Slope: 0 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 8 percent

bare soil: 75 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z.

Ecological site number: R035XC315AZ

Present vegetation: sand sagebrush, Cutler Mormon tea, sand buckwheat, sandhill
muhly

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 34' 47.50" north, 111° 35' 20.00" west

C1—0 to 2 inches (0 to 5 cm); light yellowish brown (10YR 6/4) fine sand, dark yellowish brown (10YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

C2—2 to 31 inches (5 to 79 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 3 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; few very fine, and medium roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear smooth boundary.

C3—31 to 46 inches (79 to 117 cm); reddish yellow (7.5YR 6/6) sand, strong brown (7.5YR 5/6), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots throughout; few very fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

C4—46 to 60 inches (117 to 152 cm); very pale brown (10YR 7/4) fine sand, yellowish brown (10YR 5/4), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine tubular pores; noneffervescent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 to 8, dry or moist

Texture: fine sand, very fine sand, sand, loamy fine sand

Clay: 2 to 12 percent

Reaction: neutral to strongly alkaline

Some pedons have a Cn horizon.

Nalcase soils

Taxonomic classification: Siliceous, mesic Lithic Torripsamments

Geomorphic position: occurs on interdunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone

Slope: 0 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent
 Physical cover
 canopy plant cover: 25 percent
 woody debris: 5 percent
 bare soil: 80 percent
 rock fragments: 0 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 1.3 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: low
Hydrologic group: D
Ecological site name: Sandstone Upland 10-14" p.z.
Ecological site number: R035XC314AZ
Present vegetation: blue grama
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 36' 36.60" north, 111° 36' 1.30" west

C1—0 to 5 inches (0 to 13 cm); brown (7.5YR 5/4) sand, brown (7.5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; many very fine, fine, and medium roots throughout; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

C2—5 to 10 inches (13 to 25 cm); strong brown (7.5YR 4/6) sand, dark brown (7.5YR 3/4), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; 1 percent gravel; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

C3—10 to 18 inches (25 to 46 cm); strong brown (7.5YR 4/6) loamy sand, dark brown (7.5YR 3/4), moist; 9 percent clay; massive; soft, friable, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

2R—18 inches (46 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 or 5 dry, 3 or 4 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, sand, loamy fine sand, loamy sand

Reaction: neutral or slightly alkaline

Some pedons have an A horizon.

Bispen soils

Taxonomic classification: Siliceous, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 0 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 10 percent

bare soil: 65 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 40 to 60 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 3.4 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z.

Ecological site number: R035XC315AZ

Present vegetation: sand sagebrush, Cutler Mormon tea, sand buckwheat, sandhill muhly

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 34' 15.60" north, 111° 34' 55.00" west

C1—0 to 2.5 inches (0 to 6 cm); yellowish brown (10YR 5/4) sand, brown (7.5YR 4/3), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

C2—2.5 to 7 inches (6 to 18 cm); strong brown (7.5YR 5/6) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine, and few fine and medium roots throughout; few fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

C3—7 to 22 inches (18 to 56 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine roots throughout; few fine and medium dendritic tubular pores; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

C4—22 to 45 inches (56 to 114 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine and fine dendritic tubular and common very fine irregular pores; noneffervescent; neutral, pH 7.2; diffuse wavy boundary.

C5—45 to 48 inches (114 to 122 cm); pink (7.5YR 7/4) fine sand, strong brown (7.5YR 4/6), moist; 2 percent clay; massive; slightly hard, very friable, nonsticky and

nonplastic; few very fine roots throughout; few very fine tubular pores; noneffervescent; moderately alkaline, pH 8.0; very abrupt wavy boundary.

2R—48 inches (122 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 10YR, 7.5YR

Value: 4 to 7 dry, 4 to 6 moist

Chroma: 3 to 8, dry or moist

Texture: fine sand, sand, loamy sand, loamy fine sand

Clay: 2 to 9 percent

Reaction: neutral to moderately alkaline

Some pedons have a Bw horizon that does not meet the requirements of a cambic diagnostic horizon because of coarse textures (loamy sands).

22—Mespun-Rock outcrop-Nalcasé complex, 1 to 25 percent slopes

Map Unit Setting

Landform(s): dune fields, structural benches

Elevation: 5,100 to 6,800 feet (1,554 to 2,073 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Mespun and similar soils: 35 percent

Rock outcrop: 30 percent

Nalcasé and similar soils: 25 percent

Minor Components: 10 percent

- Mespun, limy substratum
- Ustic Torripsamments soils, moderately deep and deep to lithic bedrock
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Mespun soils

Taxonomic classification: Siliceous, mesic Ustic Torripsamments

Geomorphic position: occurs on sand sheets and stabilized dunes in dune fields

Parent material: Navajo sandstone residuum weathered from sandstone and/or regional eolian sands derived from sandstone

Slope: 3 to 25 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 0 percent

bare soil: 75 percent

rock fragments

- gravel: 0 percent

Drainage class: excessively drained*Ksat solum:* 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)*Available water capacity total inches:* 4.2 (low)*Shrink-swell potential:* about 1.5 LEP (low)*Flooding hazard:* none*Runoff class:* negligible*Hydrologic group:* A*Ecological site name:* Sand Dunes 10-14" p.z.*Ecological site number:* R035XC369AZ*Present vegetation:* sand sagebrush, Cutler Mormon tea, sand buckwheat, sandhill muhly*Land capability (non irrigated):* 6c**Typical Profile***Location*

Geographic Coordinate System:

36° 18' 44.40" north, 111° 21' 53.30" west

C1—0 to 2 inches (0 to 5 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.6; gradual wavy boundary.

C2—2 to 30 inches (5 to 76 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few fine, medium, and coarse roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

C3—30 to 60 inches (76 to 152 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; slightly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics**C horizons**

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: sand, loamy sand, loamy fine sand, fine sand

Clay: 3 to 5 percent

Reaction: slightly alkaline or strongly alkaline

Rock outcrop

Exposures of steep bedrock and cliffs, which are typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

Nalcase soils

Taxonomic classification: Siliceous, mesic Lithic Torripsamments

Geomorphic position: occurs on sand sheets on structural benches

Parent material: Navajo sandstone residuum weathered from sandstone and/or Navajo sandstone eolian sands derived from sandstone

Slope: 1 to 3 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 15 percent

 woody debris: 0 percent

 bare soil: 85 percent

 rock fragments: 0 percent

 • gravel: 2 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic; 5 to 10 inches to bedrock, paralithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.5 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: negligible

Hydrologic group: D

Ecological site name: Sandstone Upland 10-14" p.z.

Ecological site number: R035XC314AZ

Present vegetation: blue grama, broom snakeweed, Cutler Mormon tea, Utah juniper, sandhill muhly, galleta, Hesperostipa, Indian ricegrass

Land capability (non irrigated): 6c

Typical Profile**Location**

Geographic Coordinate System:

36° 19' 13.20" north, 111° 23' 5.70" west

C1—0 to 2 inches (0 to 5 cm); yellowish red (5YR 5/6) and yellowish red (5YR 4/6) sand; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; 2 percent gravel; noneffervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

C2—2 to 5 inches (5 to 13 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

C3—5 to 8 inches (13 to 20 cm); red (2.5YR 5/6) loamy sand, red (2.5YR 4/6), moist; 7 percent clay; massive; loose, slightly sticky and nonplastic; common very fine and fine and few medium roots throughout; few very fine and fine dendritic tubular pores;

10 percent gravel; noneffervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Cr—8 to 10 inches (20 to 25 cm); fractured, weathered sandstone bedrock.

R—10 to 19.5 inches (25 to 50 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: sand, loamy sand, fine sand, loamy fine sand

Clay: 2 to 7 percent

Reaction: slightly alkaline or moderately alkaline

23—Mespun-Santrick-Rock outcrop complex, Mormon Ridges, 2 to 40 percent slopes

Map Unit Setting

Landform(s): dune fields, mesas

Elevation: 5,900 to 6,400 feet (1,798 to 1,951 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Mespun and similar soils: 40 percent

Santrick and similar soils: 40 percent

Rock outcrop: 10 percent

Minor Components: 10 percent

- Mathis and similar soils
- Nalcase and similar soils
- Active dunes and sand sheets

Soil Properties and Qualities

Mespun soils

Taxonomic classification: Siliceous, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone

Slope: 2 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 5 percent

bare soil: 55 percent

rock fragments: 0 percent

Drainage class: excessively drained*Ksat solum:* 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)*Available water capacity total inches:* 4.2 (low)*Shrink-swell potential:* about 1.5 LEP (low)*Flooding hazard:* none*Runoff class:* very low*Hydrologic group:* A*Ecological site name:* Sandy Upland 10-14" p.z.*Ecological site number:* R035XC315AZ*Present vegetation:* sand sagebrush, sand buckwheat, Cutler Mormon tea, sandhill muhly*Land capability (non irrigated):* 6c**Typical Profile****Location**

Geographic Coordinate System:

36° 31' 54.90" north, 111° 21' 0.00" west

C1—0 to 2 inches (0 to 5 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few fine and medium roots throughout; noneffervescent; neutral, pH 7.2; very abrupt wavy boundary.

C2—2 to 39 inches (5 to 99 cm); brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few medium tubular and few medium irregular pores; noneffervescent; slightly alkaline, pH 7.4; diffuse wavy boundary.

C3—39 to 60 inches (99 to 152 cm); reddish yellow (7.5YR 6/6) fine sand, brown (7.5YR 5/4), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few fine irregular and tubular pores; noneffervescent; strongly alkaline, pH 8.6.

Range in Characteristics**C horizons**

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 to 8, dry or moist

Texture: sand, loamy fine sand, fine sand

Clay: 2 to 6 percent

Reaction: neutral to strongly alkaline

Santrick soils*Taxonomic classification:* Siliceous, mesic Ustic Torripsamments*Geomorphic position:* occurs on sand sheets on mesa summits and in dune fields*Parent material:* eolian sands derived from sandstone*Slope:* 2 to 40 percent*Surface cover:*

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent
 moss: 0 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 65 percent
 woody debris: 8 percent
 bare soil: 50 percent
 rock fragments: 0 percent
Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 2.5 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very low
Hydrologic group: B
Ecological site name: Sandy Upland 10-14" p.z.
Ecological site number: R035XC315AZ
Present vegetation: sand sagebrush, Cutler Mormon tea, sand buckwheat, sandhill muhly
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 32' 28.40" north, 111° 20' 12.00" west

C—0 to 2 inches (0 to 5 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; few fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

Bw—2 to 11 inches (5 to 28 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 6 percent clay; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots throughout; few fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear smooth boundary.

C1—11 to 25 inches (28 to 64 cm); strong brown (7.5YR 5/6) sand, strong brown (7.5YR 4/6), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots throughout; few fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C2—25 to 33 inches (64 to 84 cm); strong brown (7.5YR 5/6) loamy fine sand, strong brown (7.5YR 4/6), moist; 5 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; common fine dendritic tubular pores; noneffervescent; strongly alkaline, pH 8.6; clear irregular boundary.

2R—33 inches (84 cm); violently effervescent; fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizon

Hue: 7.5YR, 10YR
Value: 4 to 7 dry, 3 to 6 moist
Chroma: 4 or 6, dry or moist
Texture: fine sand, sand
Clay: 2 to 7 percent
Reaction: neutral to moderately alkaline

Bw horizon

Hue: 2.5YR, 5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 4 or 6, dry or moist
Texture: loamy coarse sand, loamy sand
Clay: 4 to 8 percent
Reaction: slightly alkaline or moderately alkaline

C horizons

Hue: 5YR, 7.5YR, 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 4 to 8, dry or moist
Texture: fine sand, loamy fine sand
Clay: 3 to 7 percent

Some pedons do not have a Bw horizon.

Rock outcrop

Exposures of steep bedrock and cliffs, which are typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

24—Mespun-Councilor-Mespun, limy substratum complex, 0 to 10 percent slopes

Map Unit Setting

Landform(s): dune fields

Elevation: 5,400 to 5,900 feet (1,646 to 1,798 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Mespun and similar soils: 55 percent

Councilor and similar soils: 20 percent

Mespun, limy substratum and similar soils: 15 percent

Minor Components: 10 percent

- Coarse-loamy and Sandy soils that are less than 40 inches to lithic contact
- Rock outcrop

- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Mespun soils

Taxonomic classification: Siliceous, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone

Slope: 0 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 2 percent

bare soil: 65 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z.

Ecological site number: R035XC315AZ

Present vegetation: Cutler Mormon tea, blue grama, Douglas rabbitbrush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 20' 24.30" north, 111° 8' 34.80" west

A—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 3 percent clay; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; common very fine and few fine tubular pores; noneffervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

Bw—2 to 19 inches (5 to 48 cm); yellowish red (5YR 5/8) fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine tubular pores; noneffervescent; moderately alkaline, pH 8.4; gradual smooth boundary.

C1—19 to 38 inches (48 to 97 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine tubular pores; slightly effervescent; strongly alkaline, pH 8.6; gradual smooth boundary.

C2—38 to 60 inches (97 to 152 cm); reddish yellow (5YR 6/8) fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; few fine tubular pores; noneffervescent; strongly alkaline, pH 8.6.

Range in Characteristics

A horizon

Hue: 5YR, 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 4 or 6, dry or moist
Texture: fine sand, sand
Clay: 2 to 8 percent
Reaction: slightly alkaline or moderately alkaline

Bw horizon

Hue: 5YR, 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 4 or 6, dry or moist
Texture: fine sand, sand, loamy sand
Clay: 2 to 8 percent
Reaction: slightly alkaline or moderately alkaline

C horizons

Hue: 5YR, 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 6 or 8, dry or moist
Texture: fine sand, sand
Clay: 2 to 8 percent
Reaction: slightly alkaline to strongly alkaline

Some pedons do not have a Bw horizon.

Councilor soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, mesic Ustic Torriorthents

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone over lacustrine deposits over residuum weathered from sandstone

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 45 percent
woody debris: 5 percent
bare soil: 60 percent
rock fragments: 0 percent

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 4.5 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: B

Ecological site name: Sandy Upland 10-14" p.z. Limy, Fine

Ecological site number: R035XC373AZ

Present vegetation: Cutler Mormon tea, Indian ricegrass, broom snakeweed, galleta

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 25' 54.10" north, 111° 23' 38.60" west

A—0 to 2 inches (0 to 5 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 4/4), moist; 4 percent clay; moderate medium platy structure; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots throughout; many fine tubular and irregular pores; strongly effervescent; neutral, pH 7.2; abrupt wavy boundary.

C1—2 to 13 inches (5 to 33 cm); light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4), moist; 8 percent clay; weak coarse platy parting to weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few fine irregular and tubular pores; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

2C2—13 to 18 inches (33 to 46 cm); pinkish white (7.5YR 8/2) fine sandy loam, brown (7.5YR 5/4), moist; 15 percent clay; medium distinct light brown (7.5YR 6/4) and coarse distinct light brown (7.5YR 6/4) mottles; weak coarse angular blocky parting to moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and medium roots throughout; few very fine irregular and tubular pores; violently effervescent; strongly alkaline, pH 8.6; clear irregular boundary.

2C3—18 to 25 inches (46 to 64 cm); brown (7.5YR 5/4) fine sandy loam, strong brown (7.5YR 4/6), moist; 15 percent clay; medium distinct white (10YR 8/1) mottles; weak very coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; few very fine tubular and irregular pores; violently effervescent; strongly alkaline, pH 8.6; clear smooth boundary.

3C4—25 to 35 inches (64 to 89 cm); pink (7.5YR 7/4) fine sand, strong brown (7.5YR 4/6), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots throughout; few very fine irregular and tubular pores; strongly effervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

3C5—35 to 60 inches (89 to 152 cm); very pale brown (10YR 8/2) channery fine sand, light yellowish brown (10YR 6/4), moist; 3 percent clay; fine and medium prominent black (10YR 2/1) and fine and medium prominent yellow (10YR 8/6) mottles; massive; hard, friable, nonsticky and nonplastic; few very fine and fine roots in cracks; few very fine tubular and irregular pores; 25 percent channer; slightly effervescent; neutral, pH 7.2.

Range in Characteristics

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist
Texture: fine sand, sand
Clay: 3 to 7 percent
Reaction: slightly alkaline or moderately alkaline

C horizons

Hue: 5YR, 7.5YR, 10YR
Value: 4 to 8 dry, 3 to 6 moist
Chroma: 2 to 6, dry or moist
Texture: sandy loam, fine sandy loam, sand, fine sand
Clay: 3 to 18 percent
Reaction: slightly alkaline or moderately alkaline

Mespun, limy substratum soils

Taxonomic classification: Siliceous, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone over lacustrine deposits

Slope: 0 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent

woody debris: 5 percent

bare soil: 55 percent

rock fragments: 0 percent

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z. Limy Subsurface

Ecological site number: R035XC375AZ

Present vegetation: blue grama, broom snakeweed, Cutler Mormon tea, galleta

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 25' 38.10" north, 111° 24' 37.30" west

C1—0 to 4 inches (0 to 10 cm); strong brown (7.5YR 5/6) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

C2—4 to 12 inches (10 to 30 cm); strong brown (7.5YR 5/6) fine sand, brown (7.5YR 4/4), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine roots throughout; few very fine dendritic

tubular and tubular pores; noneffervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C3—12 to 23 inches (30 to 58 cm); brown (7.5YR 4/4) fine sand, strong brown (7.5YR 4/6), moist; 5 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

Bkn—23 to 40 inches (58 to 102 cm); light brown (7.5YR 6/3) fine sand, brown (7.5YR 4/4), moist; 7 percent clay; massive; moderately hard, friable, nonsticky and nonplastic; few fine roots throughout; few very fine and fine dendritic tubular pores; violently effervescent, 7 percent calcium carbonate equivalent; strongly alkaline, pH 8.8; clear irregular boundary.

2Cn—40 inches (102 cm); pinkish white (7.5YR 8/2) fine sand, light brown (7.5YR 6/4), moist; 6 percent clay; massive; extremely hard, slightly rigid, nonsticky and nonplastic; few fine and medium roots throughout; common very fine irregular and fine dendritic tubular pores; violently effervescent; strongly alkaline, pH 9.0.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, sand, loamy fine sand

Clay: 2 to 8 percent

Reaction: slightly alkaline or moderately alkaline

Bkn horizon

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 3 or 4, dry or moist

Texture: fine sand, sand, loamy sand, loamy fine sand

Clay: 2 to 14 percent

Reaction: moderately alkaline or strongly alkaline

Calcium carbonate equivalent: 5 to 15 percent

2Cn horizon

Hue: 5YR, 7.5YR

Value: 6 to 8 dry, 5 to 7 moist

Chroma: 2 to 4, dry or moist

Texture: sand, fine sand, loamy sand, loamy fine sand

Clay: 2 to 14 percent

Reaction: strongly alkaline or very strongly alkaline

25—Mido, limy substratum-Rizno-Westmion association, 3 to 35 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 5,200 to 6,300 feet (1,585 to 1,920 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Mido, limy substratum and similar soils: 50 percent

Rizno and similar soils: 25 percent

Westmion and similar soils: 20 percent

Minor Components: 5 percent

- Rock outcrop
- Active dunes and sand sheets

Soil Properties and Qualities

Mido, limy substratum soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized sand dunes and sand sheets on mesa summits

Parent material: eolian sands derived from sandstone over alluvium derived from sandstone and siltstone and/or eolian deposits derived from sandstone and siltstone

Slope: 3 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 5 percent

bare soil: 60 percent

rock fragments

- gravel: 5 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.4 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: Not provided

Ecological site number: Not provided

Present vegetation: Ephedra, blackbrush, pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 57' 47.80" north, 111° 2' 30.20" west

C1—0 to 3 inches (0 to 8 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and

fine roots throughout; very slightly effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

C2—3 to 12 inches (8 to 30 cm); strong brown (7.5YR 4/6) loamy fine sand, brown (7.5YR 4/4), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and common fine roots throughout; few very fine, fine, and medium dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.2; diffuse smooth boundary.

C3—12 to 25 inches (30 to 64 cm); strong brown (7.5YR 4/6) fine sand, brown (7.5YR 4/4), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C4—25 to 31 inches (64 to 79 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 5/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine, fine, and medium dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C5—31 to 49 inches (79 to 124 cm); reddish yellow (7.5YR 6/6) loamy fine sand, strong brown (7.5YR 4/6), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

2Bk—49 to 60 inches (124 to 152 cm); reddish yellow (7.5YR 6/6) fine sand, strong brown (7.5YR 4/6), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine dendritic tubular pores; common fine carbonate masses in matrix; 10 percent gravel; violently effervescent, 6 percent calcium carbonate equivalent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy fine sand

Clay: 2 to 10 percent

2Bk horizon

Hue: 7.5YR, 5YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, sand, loamy fine sand

Clay: 2 to 12 percent

Rock fragments: less than 15 percent

Calcium carbonate equivalent: 5 to 10 percent

Some pedons do not have a 2Bk horizon.

Rizno soils

Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents

Geomorphic position: occurs on structural benches and ledges on mesa escarpments

Parent material: eolian deposits derived from sandstone and siltstone

Slope: 3 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 80 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

- channer: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic*Drainage class:* excessively drained*Ksat solum:* 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)*Ksat restrictive layer:* 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)*Available water capacity total inches:* 1.0 (very low)*Shrink-swell potential:* about 1.5 LEP (low)*Flooding hazard:* none*Runoff class:* very low*Hydrologic group:* D*Ecological site name:* not provided*Ecological site number:* not provided*Present vegetation:* Ephedra, Utah juniper, blackbrush*Land capability (non irrigated):* 6c**Typical Profile***Location*

Geographic Coordinate System:

36° 57' 34.10" north, 111° 1' 22.10" west

C1—0 to 3 inches (0 to 8 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 4 percent clay; single grain; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine carbonate masses in matrix; very slightly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C2—3 to 10 inches (8 to 25 cm); strong brown (7.5YR 4/6) fine sandy loam, strong brown (7.5YR 4/6), moist; 15 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and common fine roots throughout; few very fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

R—10 inches (25 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C1 horizon

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Texture: sand, fine sand, loamy fine sand

Clay: 2 to 10 percent

Reaction: slightly alkaline or moderately alkaline

C2 horizon

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Texture: fine sandy loam, loamy fine sand

Clay: 10 to 18 percent

Reaction: slightly alkaline or moderately alkaline

Westmion soils*Taxonomic classification:* Clayey, mixed, superactive, calcareous, mesic, shallow

Ustic Torriorthents

Geomorphic position: occurs on mesa escarpments*Parent material:* residuum weathered from sandstone and siltstone*Slope:* 15 to 35 percent*Surface cover:*

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 0 percent

bare soil: 15 percent

rock fragments

• gravel: 50 percent

• cobble: 20 percent

• stone: 20 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, densic*Drainage class:* well drained*Ksat solum:* 0.00 to 5.95 inches per hour (0.01 to 42.00 micrometers per second)*Available water capacity total inches:* 3.0 (low)*Shrink-swell potential:* about 4.5 LEP (moderate)*Flooding hazard:* none*Runoff class:* very high*Hydrologic group:* D*Ecological site name:* not provided*Ecological site number:* not provided*Present vegetation:* Ephedra, Utah juniper, blackbrush, cheatgrass*Land capability (non irrigated):* 6c**Typical Profile****Location**

Geographic Coordinate System:

36° 57' 47.80" north, 111° 2' 30.20" west

C1—0 to 2 inches (0 to 5 cm); pale brown (10YR 6/3) gravelly loamy fine sand, brown (10YR 5/3), moist; 6 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; 20 percent gravel, 5 percent cobble, and 5 percent stone; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—2 to 18 inches (5 to 46 cm); 30 percent dark reddish gray (5YR 4/2) and 70 percent greenish gray (5GY 6/1) clay loam, 30 percent reddish brown (5YR 4/3) and 70 percent greenish gray (10GY 6/1), moist; 36 percent clay; massive; hard, friable,

nonsticky and moderately plastic; few fine, medium, and coarse roots throughout; few very fine dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

Cd—18 inches (46 cm); 30 percent brownish yellow (10YR 6/6) and 70 percent white (10YR 8/1) loamy fine sand, 30 percent yellowish brown (10YR 5/6) and 70 percent light gray (10YR 7/1), moist; 12 percent clay; massive; extremely hard, friable, slightly sticky and nonplastic; noneffervescent; moderately alkaline, pH 8.2.

Range in Characteristics

C1 horizon

Hue: 10YR, 7.5YR

Chroma: 3 to 6, dry or moist

Texture: loamy fine sand, very fine sand

Clay: 2 to 8 percent

Reaction: slightly alkaline or moderately alkaline

Rock fragments: 15 to 90 percent

C2 horizon

Texture: clay loam, clay

Clay: 35 to 45 percent

Reaction: slightly alkaline or moderately alkaline

Cd horizon

Texture: fine sandy loam, loamy fine sand, fine sand, very fine sand

Clay: 8 to 15 percent

Reaction: slightly alkaline or moderately alkaline

26—Mido, loamy substratum-Arches-Ustic Haplocalcids complex, Crooked Ridge, 2 to 10 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 5,400 to 5,700 feet (1,646 to 1,737 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush-Grassland

Map Unit Composition

Mido, loamy substratum and similar soils: 50 percent

Arches and similar soils: 20 percent

Ustic Haplocalcids and similar soils: 20 percent

Minor Components: 10 percent

- Rock outcrop
- Ustic Torrifluents

Soil Properties and Qualities

Mido, loamy substratum soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone and/or colluvium derived from sandstone

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 5 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 3 percent

bare soil: 75 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 0.57 to 19.98 inches per hour (4.00 to 141.00 micrometers per second)

Available water capacity total inches: 5.2 (moderate)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z.

Ecological site number: R035XC315AZ

Present vegetation: blackbrush, Cutler Mormon tea, Utah juniper

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 20' 7.40" north, 111° 23' 17.60" west

C1—0 to 3 inches (0 to 8 cm); strong brown (7.5YR 5/6) sand, strong brown (7.5YR 4/6), moist; 3 percent clay; weak medium subangular blocky structure; soft, loose, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine and fine tubular pores; noneffervescent; neutral, pH 7.2; gradual smooth boundary.

C2—3 to 10 inches (8 to 25 cm); yellowish red (5YR 4/6) sand, reddish brown (5YR 4/4), moist; 3 percent clay; massive; soft, loose, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine and fine tubular pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.4; gradual smooth boundary.

C3—10 to 24 inches (25 to 61 cm); yellowish red (5YR 5/8) sand, reddish brown (5YR 4/4), moist; 5 percent clay; massive; soft, loose, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; few very fine and fine tubular pores; violently effervescent, 16 percent calcium carbonate equivalent; slightly alkaline, pH 7.6; clear wavy boundary.

C4—24 to 58 inches (61 to 147 cm); yellowish red (5YR 5/6) gravelly sand, yellowish red (5YR 4/6), moist; 4 percent clay; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; common very fine, fine, and medium dendritic tubular and tubular pores; 15 percent gravel; strongly effervescent, 12 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt wavy boundary.

2C5—58 to 65 inches (147 to 165 cm); yellowish red (5YR 4/6) sandy clay loam, dark reddish brown (5YR 3/4), moist; 20 percent clay; moderate coarse subangular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; common very fine and fine tubular pores; 10 percent gravel; violently effervescent, 12 percent calcium carbonate equivalent; moderately alkaline, pH 8.2.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 5 or 6 dry, 4 or 5 moist

Chroma: 3 to 8, dry or moist

Texture: fine sand, sand, loamy fine sand, loamy sand

Clay: 2 to 7 percent

Reaction: neutral to moderately alkaline

2C horizon

Hue: 5YR, 7.5YR, 10YR

Value: 5 or 6 dry, 4 or 5 moist

Chroma: 3 to 6, dry or moist

Texture: loamy sand, sandy loam, sandy clay loam

Clay: 10 to 25 percent

Reaction: neutral to moderately alkaline

Some pedons have a Cn horizon that is strongly alkaline.

Arches soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments

Geomorphic position: occurs on structural benches and ledges on mesa escarpments

Parent material: eolian sands derived from sandstone

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 5 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 3 percent

bare soil: 65 percent

rock fragments

- gravel: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.9 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: D

Ecological site name: Sandstone Upland 10-14" p.z.

Ecological site number: R035XC314AZ

Present vegetation: blackbrush, Cutler Mormon tea

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 21' 7.20" north, 111° 24' 30.10" west

C1—0 to 3 inches (0 to 8 cm); reddish brown (5YR 5/4) sand, reddish brown (5YR 4/4), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

C2—3 to 14 inches (8 to 36 cm); red (2.5YR 5/6) loamy sand, red (2.5YR 4/6), moist; 8 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

2R—14 inches (36 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 2.5YR, 5YR, 7.5YR

Value: 4 or 5 dry, 3 or 4 moist

Chroma: 4 or 6, dry or moist

Texture: sand, loamy sand, fine sand

Reaction: neutral to moderately alkaline

Ustic Haplocalcids soils

Taxonomic classification: Ustic Haplocalcids

Geomorphic position: occurs on sand sheets on mesa summits

Parent material: eolian sands derived from sandstone over lacustrine deposits

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 5 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 3 percent

bare soil: 65 percent

rock fragments

- gravel: 5 percent

Depth to restrictive feature(s): 20 to 60 inches to bedrock, densic

Drainage class: moderately well drained

Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)

Available water capacity total inches: 1.5 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: Sandy Upland 10-14" p.z. Limy, Fine

Ecological site number: R035XC373AZ

Present vegetation: blackbrush, Cutler Mormon tea

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 20' 42.00" north, 111° 23' 51.10" west

C1—0 to 4 inches (0 to 10 cm); yellowish red (5YR 5/6) sand, dark reddish brown (5YR 3/4), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; common very fine irregular pores; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—4 to 18 inches (10 to 46 cm); red (2.5YR 4/6) loamy sand, dark reddish brown (2.5YR 3/4), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots in cracks and top of horizon; few very fine and fine tubular pores; noneffervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Bk—18 to 23 inches (46 to 58 cm); yellowish red (5YR 5/6) gravelly sandy loam, yellowish red (5YR 4/6), moist; 12 percent clay; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; few very fine and fine irregular pores; common fine carbonate masses in matrix; 15 percent gravel; violently effervescent, 10 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

2Cd—23 to 60 inches (58 to 152 cm); white (10YR 8/1) sandy loam, light gray (10YR 7/2), moist; 13 percent clay; massive; hard, friable, slightly sticky and slightly plastic; few very fine irregular pores; violently effervescent; strongly alkaline, pH 8.8.

Range in Characteristics

Ustic Haplocalcids have soil properties that vary outside of family class limits.

C horizons

Hue: 2.5YR, 5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, sandy loam, fine sand, sand

Clay: 4 to 10 percent

Reaction: neutral to moderately alkaline

Bk horizon

Hue: 2.5YR, 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist

Texture: sandy loam, loam

Clay: 9 to 17 percent

Calcium carbonate equivalent: 5 to 20 percent

2Cd horizon

Hue: 5YR, 10YR

Value: 6 to 8 dry, 5 to 7 moist

Chroma: 1 to 3, dry or moist

Texture: sandy loam, loam, sand

Clay: 7 to 15 percent

Calcic horizon—the zone from 18 to 23 inches (Bk horizon)

27—Mido-Gish, moderately deep-Tekapo family complex, 1 to 10 percent slopes

Map Unit Setting

Landform(s): dune fields, mesas

Elevation: 6,000 to 6,200 feet (1,829 to 1,890 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Mido and similar soils: 40 percent

Gish, moderately deep and similar soils: 35 percent

Tekapo family and similar soils: 15 percent

Minor Components: 10 percent

- Rock outcrop
- Pensom and similar soils

Soil Properties and Qualities

Mido soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone

Slope: 1 to 10 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 15 percent

 woody debris: 5 percent

 bare soil: 80 percent

 rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 5.95 to 19.98 inches per hour (42.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, Utah juniper, yucca, blue grama, broom snakeweed, Mormon tea, pricklypear and cholla, sand dropseed

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 29' 42.20" north, 110° 55' 40.10" west

C1—0 to 2 inches (0 to 5 cm); light reddish brown (5YR 6/4) fine sand, yellowish red (5YR 5/6), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

C2—2 to 17 inches (5 to 43 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

C3—17 to 48 inches (43 to 122 cm); strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6), moist; 3 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C4—48 to 60 inches (122 to 152 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; slightly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 8, dry or moist

Chroma: 1 to 6 dry, 4 to 6 moist

Texture: sand, fine sand, loamy sand

Clay: 2 to 10 percent

Reaction: slightly alkaline to strongly alkaline

Gish, moderately deep soils

Taxonomic classification: Fine, mixed, superactive, mesic Ustic Haplocambids

Geomorphic position: occurs on structural benches on mesa summits

Parent material: eolian sands derived from sandstone over residuum weathered from mudstone

Slope: 2 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 5 percent

bare soil: 60 percent

rock fragments

- gravel: 5 percent
- cobble: 5 percent
- stone: 3 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, paralithic

Drainage class: somewhat excessively drained

Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)

Ksat restrictive layer: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Available water capacity total inches: 3.6 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, Utah juniper, galleta, Mormon tea, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 28' 45.00" north, 110° 53' 54.00" west

A—0 to 3 inches (0 to 8 cm); red (2.5YR 5/6) loam, red (2.5YR 4/6), moist; 22 percent clay; weak very fine granular structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots throughout; 2 percent gravel; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Bw—3 to 6 inches (8 to 15 cm); red (2.5YR 4/6) clay loam, dark red (2.5YR 3/6), moist; 30 percent clay; massive; hard, firm, moderately sticky and moderately plastic; common very fine and fine and few medium roots throughout; common very fine dendritic tubular pores; 1 percent gravel; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Bk—6 to 22 inches (15 to 56 cm); red (2.5YR 4/6) gravelly clay loam, dark red (2.5YR 3/6), moist; 35 percent clay; strong medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine, fine, and medium roots throughout; common very fine dendritic tubular pores; few fine carbonate masses in matrix; 15 percent gravel; violently effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; gradual wavy boundary.

Cr—22 to 60 inches (56 to 152 cm); fractured, weathered sandstone and mudstone bedrock.

Range in Characteristics

A horizon

Hue: 2.5YR, 5YR, 7.5YR

Value: 3 to 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, fine sandy loam, loam, sandy clay loam

Clay: 4 to 40 percent

Reaction: slightly alkaline or moderately alkaline

Bw horizon

Hue: 2.5YR, 5YR
Value: 3 to 5, dry or moist
Chroma: 4 or 6, dry or moist
Texture: loamy fine sand, clay loam, sandy clay
Clay: 8 to 40 percent
Reaction: slightly alkaline or moderately alkaline

Bk horizon

Hue: 2.5YR, 5YR
Value: 3 to 5, dry or moist
Chroma: 4 or 6, dry or moist
Texture: clay loam, sandy clay
Clay: 30 to 40 percent
Reaction: slightly alkaline or moderately alkaline
Calcium carbonate equivalent: 0 to 4 percent

Cambic horizon—the zone from 3 to 22 inches (Bw and Bk horizons)

Tekapo family soils

Taxonomic classification: Clayey, mixed, superactive, calcareous, mesic, shallow

Ustic Torriorthents

Geomorphic position: occurs on structural benches on mesa summits and ledges on mesa escarpments

Parent material: eolian sands derived from sandstone over residuum weathered from mudstone

Slope: 2 to 4 percent

Surface cover:**Biological crust**

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent
woody debris: 10 percent
bare soil: 50 percent
rock fragments: 0 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, densic; 20 to 39 inches to bedrock, paralithic; 39 to 60 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 0.20 inches per hour (0.42 to 1.40 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.8 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, longleaf Mormon tea

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 33' 47.90" north, 111° 5' 3.20" west

C1—0 to 5 inches (0 to 13 cm); reddish brown (2.5YR 4/4) sandy clay, dark reddish brown (2.5YR 3/4), moist; 38 percent clay; moderate very thin platy parting to weak medium granular structure; loose, very sticky and moderately plastic; few very fine, fine, and coarse roots throughout; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—5 to 12 inches (13 to 30 cm); reddish brown (2.5YR 4/4) sandy clay, dark reddish brown (2.5YR 3/4), moist; 38 percent clay; massive; hard, firm, very sticky and moderately plastic; common very fine, fine, and few coarse roots throughout; few very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

Cd—12 to 25 inches (30 to 64 cm); reddish brown (2.5YR 4/4) sandy clay, dark reddish brown (2.5YR 3/4), moist; 45 percent clay; massive; hard, firm, very sticky and very plastic; few very fine, fine, and medium roots in cracks; few very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

Cr—25 to 43 inches (64 to 109 cm); fractured, weathered sandstone, mudstone, and shale bedrock.

R—43 inches (109 cm); fractured, unweathered sandstone, mudstone, and shale bedrock.

Range in Characteristics

Tekapo family differs from the series because the series does not have a lithic contact.

C horizons

Hue: 2.5YR, 5YR

Value: 3 to 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sandy loam, loam, sandy clay loam, clay loam, sandy clay

Clay: 8 to 45 percent

Reaction: slightly alkaline or moderately alkaline

28—Mido-Radnik-Riverwash complex, 1 to 8 percent slopes

Map Unit Setting

Landform(s): canyons

Elevation: 4,400 to 6,800 feet (1,341 to 2,073 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Mido and similar soils: 70 percent
 Radnik and similar soils: 15 percent
 Riverwash: 10 percent
 Minor Components: 5 percent

- Rock outcrop
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Mido soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on climbing dunes in canyon bottoms

Parent material: alluvium derived from sandstone and/or eolian sands derived from sandstone

Slope: 1 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 60 percent

woody debris: 10 percent

bare soil: 30 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.9 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, blue grama, broom snakeweed, fourwing saltbush, galleta, longleaf Mormon tea

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 42' 50.90" north, 111° 13' 45.60" west

C—0 to 2 inches (0 to 5 cm); reddish yellow (7.5YR 6/6) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

Bw—2 to 8 inches (5 to 20 cm); red (2.5YR 4/6) loamy sand, dark red (2.5YR 3/6), moist; 12 percent clay; moderate medium prismatic structure; slightly hard, very friable, nonsticky and nonplastic; common fine and few medium roots throughout; few

fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.6; abrupt irregular boundary.

C1—8 to 21 inches (20 to 53 cm); red (2.5YR 5/6) loamy sand, red (2.5YR 4/6), moist; 8 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common fine and few medium roots throughout; few fine dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent; strongly alkaline, pH 8.6; gradual smooth boundary.

C2—21 to 43 inches (53 to 109 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent; strongly alkaline, pH 8.6; clear smooth boundary.

Cn—43 to 63 inches (109 to 160 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine tubular pores; violently effervescent; strongly alkaline, pH 8.8.

Range in Characteristics

C horizons

Hue: 2.5YR, 5YR, 7.5YR
Value: 4 to 6 dry, 4 to 6 moist
Chroma: 4 to 8, dry or moist
Texture: fine sand, sand
Clay: 2 to 8 percent

Bw horizon

Hue: 2.5YR, 5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 6 or 8, dry or moist
Texture: sand, loamy sand
Clay: 2 to 12 percent

C1, C2, and Cn horizons

Hue: 2.5YR, 5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 6 or 8, dry or moist
Texture: sand, loamy sand, loamy fine sand
Clay: 2 to 8

Some pedons do not have a Bw horizon.

Radnik soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stream terraces and alluvial flats in canyon bottoms

Parent material: alluvium derived from sandstone and/or eolian sands derived from sandstone

Slope: 1 to 2 percent

Surface cover:

Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent

gypsum: 0 percent
 Physical cover
 canopy plant cover: 60 percent
 woody debris: 10 percent
 bare soil: 40 percent
 rock fragments: 0 percent
Drainage class: excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Available water capacity total inches: 5.0 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: very low
Hydrologic group: A
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: winterfat
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 42' 47.50" north, 111° 13' 36.40" west

C1—0 to 2 inches (0 to 5 cm); reddish brown (5YR 4/4) sandy loam, dark reddish brown (5YR 3/4), moist; 19 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—2 to 10 inches (5 to 25 cm); yellowish red (5YR 4/6) sandy loam, (5YR 3/6), moist; 19 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; common very fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

C3—10 to 23 inches (25 to 58 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and coarse roots throughout; few very fine dendritic tubular pores; few medium carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

C4—23 to 33 inches (58 to 84 cm); yellowish red (5YR 5/6) coarse sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few medium carbonate masses in matrix; 1 percent gravel; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C5—33 to 37 inches (84 to 94 cm); reddish brown (2.5YR 5/4) coarse sand, reddish brown (2.5YR 4/4), moist; 2 percent clay; massive; moderately hard, friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C6—37 to 40 inches (94 to 102 cm); red (2.5YR 5/6) coarse sand, reddish brown (2.5YR 4/4), moist; 3 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; few very fine roots throughout; 8 percent gravel; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Bkb—40 to 60 inches (102 to 152 cm); yellowish red (5YR 5/6) sandy loam, reddish brown (5YR 4/4), moist; 16 percent clay; weak coarse angular blocky structure;

moderately hard, very friable, slightly sticky and nonplastic; few very fine roots throughout; few very fine and fine dendritic tubular pores; few continuous carbonate coats between sand grains and few fine carbonate masses in matrix; strongly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.2.

Range in Characteristics

The Radnik soil is a taxadjunct to the official series and classifies as a mixed, mesic Ustic Torripsamments because of the higher percentage of clay that occurs outside the particle-size control section. The official series classifies as a Coarse-loamy, mixed superactive, calcareous, mesic Ustic Torrifluvents. This does not affect use and management.

C1 and C2 horizons

Hue: 2.5YR, 5YR, 7.5YR
 Value: 4 or 5 dry, 3 to 5 moist
 Chroma: 4 or 6, dry or moist
 Clay: 10 to 19 percent
 Reaction: moderately alkaline or strongly alkaline

C3 through C6 horizons

Hue: 2.5YR, 5YR
 Value: 4 or 5 dry, 3 or 4 moist
 Chroma: 4 or 6, dry or moist
 Texture: coarse sand, sand, loamy sand
 Clay: 2 to 5 percent
 Reaction: moderately alkaline or strongly alkaline

Bkb horizon

Hue: 2.5YR, 5YR
 Value: 4 or 5, dry or moist
 Chroma: 4 or 6, dry or moist
 Texture: loamy sand, sandy loam
 Clay: 8 to 16 percent
 Calcium carbonate equivalent: 0 to 4 percent
 Reaction: moderately alkaline or strongly alkaline

Some pedons do not have a Bkb horizon.

Riverwash

Unstabilized sandy, silty, clayey, or gravelly sediment that is flooded, washed, and reworked frequently by rivers, and usually is devoid of vegetation.

29—Mido-Pensom, moderately deep-Ustic Haplocambids complex, 1 to 10 percent slopes

Map Unit Setting

Landform(s): dune fields, mesas
Elevation: 5,500 to 6,000 feet (1,676 to 1,829 meters)
Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)
Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

- Mido and similar soils: 50 percent
 Pensom, moderately deep and similar soils: 25 percent
 Ustic Haplocambids and similar soils: 15 percent
 Minor Components: 10 percent
- Rock outcrop
 - Needle and similar soils
 - Active dunes and sand sheets

Soil Properties and Qualities

Mido soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes in dune fields

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent

woody debris: 5 percent

bare soil: 70 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: Sand Dunes 10-14" p.z.

Ecological site number: R035XC369AZ

Present vegetation: Cutler Mormon tea, dune broom, sand buckwheat, sand sagebrush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 40' 53.70" north, 111° 6' 23.20" west

C1—0 to 3 inches (0 to 8 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

C2—3 to 7 inches (8 to 18 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

C3—7 to 60 inches (18 to 152 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine dendritic tubular pores; noneffervescent; neutral, pH 7.2.

Range in Characteristics

C horizons

Hue: 2.5YR, 5YR, 7.5YR
 Value: 3 to 5 dry, 3 to 4 moist
 Chroma: 4 or 6, dry or moist
 Texture: fine sand, sand, coarse sand, loamy sand
 Clay: 2 to 5 percent
 Reaction: neutral to moderately alkaline

Pensom, moderately deep soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on interdunes in dune fields

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 2 to 10 percent

Surface cover:

Biological crust
 cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 50 percent
 woody debris: 5 percent
 bare soil: 70 percent
 rock fragments: 0 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 2.8 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z.

Ecological site number: R035XC315AZ

Present vegetation: blue grama, sand buckwheat, sand sagebrush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 42' 55.90" north, 111° 25' 46.60" west

C1—0 to 3 inches (0 to 8 cm); light yellowish brown (10YR 6/4) fine sand, dark yellowish brown (10YR 4/4), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine roots throughout; few very fine irregular pores; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

C2—3 to 21 inches (8 to 53 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; common very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; very abrupt smooth boundary.

C3—21 to 36 inches (53 to 91 cm); brownish yellow (10YR 6/6) fine sand, strong brown (7.5YR 5/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; common very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; very abrupt smooth boundary.

C4—36 to 40 inches (91 to 102 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 5 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

R—40 inches (102 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 6 dry

Chroma: 4 or 6, dry or moist

Texture: fine sand, sand, loamy sand

Clay: 2 to 6 percent

Reaction: neutral to moderately alkaline

Ustic Haplocambids soils

Taxonomic classification: Ustic Haplocambids

Geomorphic position: occurs on structural benches on mesa summits

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 60 percent

woody debris: 0 percent

bare soil: 60 percent

rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 0.06 to 19.98 inches per hour (0.42 to 141.00 micrometers per second)

Available water capacity total inches: 7.7 (high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very low

Hydrologic group: B

Ecological site name: Sandy Upland 10-14" p.z. Limy, Fine

Ecological site number: R035XC373AZ

Present vegetation: Cutler Mormon tea, blue grama, galleta

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 40' 55.00" north, 111° 6' 34.70" west

C1—0 to 4 inches (0 to 10 cm); brown (7.5YR 5/4) fine sand, strong brown (7.5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots throughout; many very fine irregular pores; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

C2—4 to 19 inches (10 to 48 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium roots throughout; few very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

Bw—19 to 24 inches (48 to 61 cm); yellowish red (5YR 5/8) sandy loam, yellowish red (5YR 4/6), moist; 10 percent clay; moderate very coarse angular blocky structure; hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; common very fine dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.0; abrupt irregular boundary.

2C1—24 to 46 inches (61 to 117 cm); yellowish red (5YR 4/6) clay, dark reddish brown (5YR 3/4), moist; 45 percent clay; strong medium angular blocky and moderate very coarse columnar structure; very hard, friable, nonsticky and nonplastic; common very fine roots between peds, and few very fine and medium roots throughout; few very fine dendritic tubular pores; many distinct pressure faces and many carbonate coats on all faces of peds; violently effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

2C2—46 to 50 inches (117 to 127 cm); yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6), moist; 35 percent clay; moderate medium angular blocky structure; moderately hard, friable, nonsticky and nonplastic; few very fine roots between peds; few very fine dendritic tubular pores; common distinct pressure faces and common carbonate coats on all faces of peds; common fine and medium carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

2C3—50 to 60 inches (127 to 152 cm); yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6), moist; 40 percent clay; moderate medium platy structure; hard, friable, nonsticky and nonplastic; few very fine roots between peds; common distinct pressure faces and common prominent carbonate coats on all faces of peds; common fine, medium, and coarse carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

Ustic Haplocambids have soil properties that vary outside of family class limits.

C horizons

Hue: 2.5YR, 5YR, 7.5YR
 Value: 4 to 6, dry or moist
 Chroma: 4 or 6, dry or moist
 Texture: fine sand, sand, loamy sand
 Clay: 2 to 5 percent
 Reaction: slightly alkaline or moderately alkaline

Bw horizon

Hue: 2.5YR, 5YR
 Value: 4 to 6, dry or moist
 Chroma: 6 or 8, dry or moist
 Texture: loamy sand, sandy loam
 Clay: 5 to 10
 Reaction: slightly alkaline or moderately alkaline

2C horizons

Hue: 2.5YR, 5YR
 Value: 4 to 6 dry, 3 to 6 moist
 Chroma: 4 or 6, dry or moist
 Texture: loam, clay, clay loam
 Clay: 25 to 45 percent
 Reaction: moderately alkaline or strongly alkaline

Cambic horizon—the zone from 19 to 24 inches (Bw horizon)

30—Monue-Monue, moderately deep complex, 1 to 8 percent slopes

Map Unit Setting

Landform(s): fan remnants

Elevation: 5,000 to 5,300 feet (1,524 to 1,615 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Monue and similar soils: 70 percent

Monue, moderately deep and similar soils: 20 percent

Minor Components: 10 percent

- Typic Torriorthents
- Gullied land

Soil Properties and Qualities

Monue soils

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Haplocambids

Geomorphic position: occurs on stabilized dunes on fan remnants

Parent material: alluvium derived from sandstone and/or eolian sands derived from sandstone

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 5 percent

bare soil: 60 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)

Available water capacity total inches: 6.1 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: broom snakeweed, longleaf Mormon tea, rabbitbrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 58' 7.60" north, 110° 20' 10.00" west

C—0 to 3 inches (0 to 8 cm); yellowish red (5YR 5/8) sand, yellowish red (5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bw—3 to 14 inches (8 to 36 cm); yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6), moist; 19 percent clay; moderate coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; common very fine and few fine dendritic tubular pores; few fine, medium, and coarse carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

Cn—14 to 30 inches (36 to 76 cm); reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 4/6), moist; 19 percent clay; massive; soft, loose, nonsticky and nonplastic; few medium and coarse roots throughout; common very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.8; clear wavy boundary.

2C—30 to 60 inches (76 to 152 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; massive; slightly hard, very friable,

nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

C horizon

Hue: 2.5YR, 5YR, 7.5YR
Value: 4 or 5, dry or moist
Chroma: 6 or 8, dry or moist
Texture: sand, fine sand
Clay: 2 to 5 percent
Reaction: slightly alkaline or moderately alkaline

Bw, Cn, and 2C horizons

Hue: 5YR, 7.5YR
Value: 4 to 6, dry or moist
Chroma: 6 or 8, dry or moist
Texture: coarse sand, sand, loamy sand, loamy fine sand, fine sandy loam
Clay: 2 to 19 percent
Reaction: slightly alkaline to strongly alkaline

Cambic horizon—the zone from 3 to 14 inches (Bw horizons)

Monue, moderately deep soils

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Haplocambids

Geomorphic position: occurs on stabilized dunes on fan remnants

Parent material: alluvium derived from sandstone and/or eolian sands derived from sandstone

Slope: 1 to 8 percent

Surface cover:

Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust
salt: 0 percent
gypsum: 0 percent

Physical cover
canopy plant cover: 35 percent
woody debris: 5 percent
bare soil: 60 percent
rock fragments: 0 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 0.57 to 19.98 inches per hour (4.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 3.9 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: broom snakeweed, longleaf Mormon tea, rabbitbrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 58' 13.10" north, 110° 20' 17.60" west

C—0 to 3 inches (0 to 8 cm); yellowish red (5YR 5/8) sand, yellowish red (5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bw—3 to 14 inches (8 to 36 cm); yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6), moist; 19 percent clay; moderate coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; 3 percent fine gravel; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C—14 to 38 inches (36 to 97 cm); yellowish red (5YR 5/8) loamy fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; 1 percent fine gravel; violently effervescent; strongly alkaline, pH 8.6; clear smooth boundary.

R—38 inches (97 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizon

Hue: 5YR, 7.5YR

Value: 4 or 5, dry or moist

Chroma: 6 or 8, dry or moist

Texture: sand, loamy sand

Clay: 2 to 5 percent

Reaction: moderately alkaline or strongly alkaline

Bw and C horizon

Hue: 5YR, 7.5YR

Value: 5 or 6, dry or moist

Chroma: 6 or 8, dry or moist

Texture: sand, fine sand, loamy fine sand, fine sandy loam

Clay: 2 to 19 percent

Reaction: moderately alkaline or strongly alkaline

Cambic horizon—the zone from 3 to 14 inches (Bw horizon)

31—Needle-Sheppard complex, 2 to 12 percent slopes

Map Unit Setting

Landform(s): dune fields

Elevation: 4,300 to 4,600 feet (1,311 to 1,402 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Needle and similar soils: 65 percent

Sheppard and similar soils: 25 percent

Minor Components: 10 percent

- Rock outcrop
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Needle soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments

Geomorphic position: occurs on interdunes and sand sheets on dune fields

Parent material: eolian sands derived from sandstone

Slope: 2 to 12 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 5 percent

bare soil: 65 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.1 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Sandstone Upland 6-10" p.z. Calcareous

Ecological site number: R035XB230AZ

Present vegetation: fourwing saltbush, Indian ricegrass, black grama, blue grama, sideoats grama, Ephedra, Pleuraphis jamesii, Hesperostipa comata ssp. comata

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 51' 41.80" north, 111° 29' 41.00" west

C1—0 to 2 inches (0 to 5 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR

5/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

C2—2 to 16 inches (5 to 41 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

2R—16 inches (41 cm); slightly effervescent; fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 to 8, dry or moist

Texture: sand, fine sand, loamy fine sand

Clay: 2 to 4 percent

Reaction: neutral to moderately alkaline

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on dunes and sand sheets on dune fields

Parent material: alluvium derived from sandstone and/or eolian sands derived from sandstone

Slope: 2 to 12 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 5 percent

bare soil: 75 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 3.6 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Sandy Upland 6-10" p.z. Limy Subsurface

Ecological site number: R035XB206AZ

Present vegetation: Indian ricegrass, *Hesperostipa comata* ssp. *comata*, *Pleuraphis jamesii*, fourwing saltbush, sand dropseed, sand sagebrush, *Ephedra*, black grama

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 51' 40.60" north, 111° 29' 40.90" west

C1—0 to 2 inches (0 to 5 cm); reddish yellow (5YR 6/6) sand, yellowish red (5YR 5/6), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

C2—2 to 18 inches (5 to 46 cm); red (2.5YR 5/6) sand, red (2.5YR 4/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C3—18 to 53 inches (46 to 135 cm); reddish yellow (5YR 6/6) sand, yellowish red (5YR 5/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and coarse roots throughout; few fine dendritic tubular pores; 2 percent gravel; strongly effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

C4—53 to 60 inches (135 to 152 cm); reddish yellow (5YR 6/6) sand, yellowish red (5YR 5/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 to 8, dry or moist

Texture: sand, fine sand, loamy sand, loamy fine sand

Clay: 2 to 4 percent

Reaction: slightly alkaline or moderately alkaline

32—Pensom-Arches-Rock outcrop complex, 2 to 25 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 6,200 to 7,000 feet (1,889 to 2,133 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Pensom and similar soils: 55 percent

Arches and similar soils: 25 percent

Rock outcrop: 15 percent

Minor Components: 5 percent

- Denazar and similar soils
- Active dunes and sand sheets
- Haplocambids with a fine-loamy particle size class

Soil Properties and Qualities

Pensom soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 3 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 10 percent

bare soil: 50 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 40 to 60 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 2.9 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z.

Ecological site number: R035XC315AZ

Present vegetation: Cutler Mormon tea, blue grama, sandhill muhly

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 32' 4.10" north, 111° 33' 13.70" west

C1—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/4) fine sand, light brown (7.5YR 6/4), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; few fine roots throughout; noneffervescent; neutral, pH 7.2; clear wavy boundary.

C2—4 to 12 inches (10 to 30 cm); light brown (7.5YR 6/4) sand, brown (7.5YR 4/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very

fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C3—12 to 22 inches (30 to 56 cm); reddish brown (5YR 5/4) sand, reddish brown (5YR 4/4), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout and few fine and medium roots throughout; few fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

C4—22 to 42 inches (56 to 107 cm); fine sand, strong brown (7.5YR 5/6) and strong brown (7.5YR 4/6), moist; 5 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine dendritic tubular pores; noneffervescent; strongly alkaline, pH 8.6; abrupt wavy boundary.

R—42 inches (107 cm); fractured, unweathered sandstone, mudstone, and shale bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, sand, loamy sand

Clay: 2 to 5 percent

Reaction: neutral to strongly alkaline

Arches soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments

Geomorphic position: occurs on sand sheets on mesa summits and ledges on mesa escarpments

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 2 to 25 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 70 percent

woody debris: 10 percent

bare soil: 50 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.9 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: D

Ecological site name: Juniperus osteosperma/Artemisia bigelovii-Purshia
stansburiana/Achnatherum hymenoides-Hesperostipa neomexicana

Ecological site number: F035XC322AZ

Present vegetation: Colorado pinyon, Utah juniper

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 31' 36.70" north, 111° 32' 39.90" west

C1—0 to 1 inch (0 to 2 cm); strong brown (7.5YR 5/6) sand, strong brown (7.5YR 4/6), moist; 2 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; noneffervescent; neutral, pH 7.2; very abrupt smooth boundary.

C2—1 inch to 2 inches (2 to 5 cm); strong brown (7.5YR 5/6) sand, strong brown (7.5YR 4/6), moist; 2 percent clay; massive; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

C3—2 to 7 inches (5 to 18 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 5 percent clay; massive; loose, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots throughout; common very fine irregular pores; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

Bw—7 to 11 inches (18 to 28 cm); reddish brown (5YR 4/4) loamy sand, dark reddish brown (5YR 3/4), moist; 10 percent clay; weak coarse subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common coarse and very coarse roots throughout; noneffervescent; moderately alkaline, pH 8.2; clear wavy boundary.

R—11 inches (28 cm); fractured, unweathered sandstone and mudstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: sand, loamy sand, coarse sand

Clay: 2 to 7 percent

Reaction: slightly alkaline or moderately alkaline

Bw horizon

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, loamy fine sand

Clay: 5 to 12 percent

Reaction: slightly alkaline or moderately alkaline

Rock outcrop

Exposures of steep bedrock and cliffs, which are typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

33—Pinavetes-Begay complex, White Mesa, 1 to 5 percent slopes

Map Unit Setting

Landform(s): fan remnants, mesas

Elevation: 6,300 to 6,600 feet (1,920 to 2,012 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.2 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.3 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Pinavetes and similar soils: 50 percent

Begay and similar soils: 30 percent

Minor Components: 20 percent

- Arches and similar soils
- Earleweed and similar soils
- Rock outcrop
- Riverwash

Soil Properties and Qualities

Pinavetes soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits

Parent material: alluvium derived from sandstone

Slope: 1 to 5 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 25 percent

 woody debris: 15 percent

 bare soil: 80 percent

 rock fragments: 0 percent

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 5.1 (moderate)

Shrink-swell potential: about 2.0 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, Utah juniper, Wyoming big sagebrush, blue grama, broom snakeweed, pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 30' 0.40" north, 111° 1' 27.20" west

C1—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/4) sand, brown (7.5YR 4/4), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

C2—2 to 16 inches (5 to 41 cm); reddish yellow (7.5YR 6/6) fine sand, brown (7.5YR 4/4), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium and coarse roots throughout; few fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear smooth boundary.

C3—16 to 48 inches (41 to 122 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few medium and coarse roots throughout; few very fine dendritic tubular pores; few fine and medium carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

2C4—48 to 60 inches (122 to 152 cm); white (5Y 8/1) very fine sandy loam, light gray (5Y 7/2), moist; 7 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few coarse roots throughout; common fine and medium carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizons

Hue: 7.5YR, 10YR, 2.5Y, 5Y

Value: 4 to 8 dry, 4 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy sand

Clay: 1 to 8 percent

Reaction: neutral to strongly alkaline

2C4 horizon

Hue: 10YR, 2.5Y, 5Y

Value: 4 to 8 dry, 4 to 7 moist

Chroma: 1 to 6, dry or moist

Texture: sand, fine sand, loamy sand, very fine sandy loam

Clay: 5 to 15 percent

Reaction: moderately alkaline or strongly alkaline

Begay soils

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Ustic

Haplocambids

Geomorphic position: occurs on stream terraces on fan remnants

Parent material: alluvium derived from sandstone

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 20 percent
 woody debris: 10 percent
 bare soil: 75 percent
 rock fragments: 0 percent
Drainage class: well drained
Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)
Available water capacity total inches: 7.8 (high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: low
Hydrologic group: B
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: Utah juniper, blue grama, broom snakeweed, pricklypear and cholla
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:
 36° 29' 22.30" north, 111° 1' 36.10" west

A—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) loam, brown (10YR 4/3), moist; 18 percent clay; weak thick platy parting to weak fine subangular blocky structure; soft, very friable, moderately sticky and slightly plastic; common very fine and few fine roots throughout; common very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

Bw1—2 to 8 inches (5 to 20 cm); yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4), moist; 15 percent clay; weak medium prismatic parting to moderate medium subangular blocky structure; slightly hard, very friable, moderately sticky and slightly plastic; common very fine, many fine, and few medium roots throughout; common very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

Bw2—8 to 18 inches (20 to 46 cm); brown (7.5YR 5/4) loam, brown (7.5YR 4/4), moist; 18 percent clay; weak medium prismatic parting to weak medium subangular blocky; slightly hard, very friable, moderately sticky and slightly plastic; common very fine and fine, and few medium and coarse roots throughout; common very fine and fine, and few medium and coarse dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

C1—18 to 30 inches (46 to 76 cm); brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4), moist; 16 percent clay; weak medium prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; common very fine and fine dendritic tubular pores; common very fine and fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C2—30 to 44 inches (76 to 112 cm); brown (7.5YR 5/4) loamy very fine sand, brown (7.5YR 4/4), moist; 4 percent clay; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine and fine roots throughout; common very fine and fine dendritic tubular and few coarse tubular pores; common very fine and few fine

carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.6; gradual wavy boundary.

C3—44 to 62 inches (112 to 157 cm); brownish yellow (10YR 6/6) loamy fine sand, dark yellowish brown (10YR 4/4), moist; 5 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few very fine and fine carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

A horizon

Hue: 7.5YR, 10YR
Value: 4 to 6, dry or moist
Chroma: 3 or 6, dry or moist
Texture: loam, fine sandy loam, loamy fine sand
Clay: 10 to 20 percent
Reaction: moderately alkaline or strongly alkaline

Bw horizons

Hue: 7.5YR, 10YR
Value: 4 to 6, dry or moist
Chroma: 3 or 6, dry or moist
Texture: loam, fine sandy loam, loamy fine sand
Clay: 10 to 20 percent
Sodium Adsorption Ratio: 6 to 13

C1 horizon

Hue: 7.5YR, 10YR
Value: 4 to 6, dry or moist
Chroma: 3 or 6, dry or moist
Texture: loam, fine sandy loam, loamy fine sand
Clay: 5 to 20 percent
Reaction: moderately alkaline or strongly alkaline

C2 and C3 horizons

Hue: 7.5YR, 10YR, 5Y
Value: 4 to 8 dry, 4 or 5 moist
Chroma: 4 or 6, dry or moist
Texture: loamy very fine sand, loamy fine sand
Clay: 1 to 10 percent

Cambic horizon—the zone from 2 to 18 inches (Bw horizons)

34—Pinavetes-Pinavetes, moderately deep association, White Mesa, 1 to 15 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 6,300 to 7,200 feet (1,920 to 2,195 meters)

Mean annual precipitation: 12 to 14 inches (305 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Pinavetes and similar soils: 75 percent

Pinavetes, moderately deep and similar soils: 15 percent

Minor Components: 10 percent

- Rock outcrop
- Marcou and similar soils

Soil Properties and Qualities

Pinavetes soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits

Parent material: eolian sands derived from sandstone and shale

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 5 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 10 percent

bare soil: 60 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.1 (low)

Shrink-swell potential: about 1.0 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Wyoming big sagebrush, yucca, broom snakeweed, pinyon, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 32' 19.20" north, 110° 57' 29.30" west

C1—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/4) sand, brown (7.5YR 4/4), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

C2—2 to 7 inches (5 to 18 cm); strong brown (7.5YR 5/6) loamy sand, brown (7.5YR 4/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

C3—7 to 22 inches (18 to 56 cm); yellowish brown (10YR 5/6) fine sand, dark yellowish brown (10YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine and common medium and few coarse roots throughout; few very fine dendritic tubular and few fine dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C4—22 to 38 inches (56 to 97 cm); yellowish brown (10YR 5/4) sand, dark yellowish brown (10YR 4/4), moist; 4 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses lining pores; strongly effervescent; moderately alkaline, pH 8.2; gradual smooth boundary.

2C5—38 to 49 inches (97 to 124 cm); brownish yellow (10YR 6/6) sand, yellowish brown (10YR 5/6), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses lining pores; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

2C6—49 to 60 inches (124 to 152 cm); pale yellow (2.5Y 7/4) sand, light yellowish brown (2.5Y 6/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and coarse roots throughout; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

C horizons

Hue: 7.5YR, 10YR, 2.5Y
 Value: 4 to 7 dry, 4 to 6 moist
 Chroma: 4 or 6, dry or moist
 Texture: sand, fine sand, loamy sand
 Clay: 1 to 8 percent
 Reaction: neutral to moderately alkaline

Pinavetes, moderately deep soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits

Parent material: eolian sands derived from sandstone and shale

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent
 woody debris: 60 percent
 bare soil: 30 percent
 rock fragments: 0 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, paralithic; 20 to 40 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.5 (very low)

Shrink-swell potential: about 1.0 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, Wyoming big sagebrush, yucca, pinyon, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 32' 18.10" north, 110° 57' 24.80" west

C1—0 to 2 inches (0 to 5 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 4/4), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; few fine carbonate masses in matrix; slightly effervescent; neutral, pH 7.2; abrupt smooth boundary.

C2—2 to 9 inches (5 to 23 cm); brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine and common medium roots throughout; few very fine and fine dendritic tubular pores; few fine carbonate masses in matrix; 8 percent gravel; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C3—9 to 14 inches (23 to 36 cm); light yellowish brown (10YR 6/4) fine sand, dark yellowish brown (10YR 4/4), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; 10 percent gravel; violently effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C4—14 to 21 inches (36 to 53 cm); light yellowish brown (2.5Y 6/3) sand, light olive brown (2.5Y 5/3), moist; 5 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses lining pores; 14 percent gravel; violently effervescent; moderately alkaline, pH 8.4; gradual smooth boundary.

2Cr—21 to 24 inches (53 to 61 cm); fractured, weathered sandstone bedrock.

2R—24 inches (61 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 7.5YR, 10YR, 2.5Y

Value: 4 to 7 dry, 4 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, sand, loamy sand

Clay: 1 to 8 percent

Reaction: neutral to moderately alkaline

Some pedons do not have a Cr horizon.

35—Pinavetes-Rock outcrop complex, White Mesa, 5 to 60 percent slopes

Map Unit Setting

Landform(s): escarpments

Elevation: 5,900 to 7,200 feet (1,798 to 2,195 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Pinavetes and similar soils: 50 percent

Rock outcrop: 40 percent

Minor Components: 10 percent

- Active dunes and sand sheets
- Moclom and similar soils

Soil Properties and Qualities

Pinavetes soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on climbing dunes on escarpments

Parent material: eolian sands

Slope: 5 to 60 percent

Surface cover:

Biological crust

 cyanobacteria: 5 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 10 percent

 woody debris: 5 percent

 bare soil: 80 percent

 rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 5.0 (low)

Shrink-swell potential: about 0.0 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, Utah juniper, Wyoming big sagebrush, yucca, broom snakeweed, pinyon, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 31' 36.26" north, 110° 57' 17.22" west

C1—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and few fine roots throughout; few very fine tubular pores; slightly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

C2—1 inch to 9 inches (3 to 23 cm); brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/4), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots throughout; few very fine, fine, and medium tubular pores; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

2C3—9 to 17 inches (23 to 43 cm); yellowish brown (10YR 5/6) fine sand, dark yellowish brown (10YR 4/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; common fine, many medium, and few coarse roots throughout; few fine tubular pores; 5 percent gravel; slightly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

2C4—17 to 68 inches (43 to 173 cm); brownish yellow (10YR 6/6) fine sand, dark yellowish brown (10YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; common medium and coarse roots throughout; few fine tubular pores; slightly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

C horizons

Hue: 7.5YR, 10YR

Value: 4 to 8 dry, 4 or 5 moist

Chroma: 4 or 6, dry or moist

Texture: loamy fine sand, fine sand, sand, loamy sand

Clay: 1 to 10 percent

Reaction: neutral to strongly alkaline

Rock outcrop

Exposures of steep bedrock and cliffs, which are typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

36—Pinpoint-Aridic Ustorthents-Riverwash complex, 1 to 5 percent slopes

Map Unit Setting

Landform(s): canyons

Elevation: 6,300 to 8,200 feet (1,920 to 2,499 meters)

Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)

Mean annual air temperature: 46 to 50 degrees F (8.0 to 10.0 degrees C)

Mean annual soil temperature: 48 to 52 degrees F (9.1 to 11.1 degrees C)

Frost-free period: 120 to 150 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-6AZ Colorado Plateau Pinyon-Juniper Sagebrush

Map Unit Composition

Pinepoint and similar soils: 80 percent
 Aridic Ustorthents and similar soils: 10 percent
 Riverwash: 5 percent
 Minor Components: 5 percent

- Parkwash and similar soils
- Active dunes and sand sheets

Soil Properties and Qualities

Pinepoint soils

Taxonomic classification: Mesic, coated Ustic Quartzipsamments

Geomorphic position: occurs on stream terraces, stabilized dunes, and sand sheets in canyon bottoms

Parent material: eolian sands derived from sandstone over alluvium derived from sandstone and shale

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 25 percent

bare soil: 35 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 3.8 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Wyoming big sagebrush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 51' 54.70" north, 110° 35' 43.20" west

C1—0 to 1 inch (0 to 3 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and few fine roots throughout; noneffervescent; neutral, pH 7.2; clear wavy boundary.

C2—1 inch to 12 inches (3 to 30 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic;

few very fine and fine roots throughout; few very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

Ab—12 to 17 inches (30 to 43 cm); brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/4), moist; 8 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; clear wavy boundary.

C—17 to 60 inches (43 to 152 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2.

Range in Characteristics

C1, C2, and C horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, loamy fine sand

Clay: 2 to 8 percent

Reaction: neutral to moderately alkaline

Ab horizon

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: loamy fine sand, fine sand

Clay: 2 to 8 percent

Reaction: neutral to moderately alkaline

Aridic Ustorthents soils

Taxonomic classification: Aridic Ustorthents

Geomorphic position: occurs on stream terraces in canyon bottoms

Parent material: eolian sands derived from sandstone over alluvium derived from sandstone and shale

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 40 percent

bare soil: 25 percent

rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Available water capacity total inches: 5.0 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Wyoming big sagebrush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 51' 50.90" north, 110° 35' 34.50" west

C1—0 to 5 inches (0 to 13 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine roots throughout and few fine roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; clear wavy boundary.

C2—5 to 14 inches (13 to 36 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; clear wavy boundary.

C3—14 to 31 inches (36 to 79 cm); 10 percent brown (7.5YR 4/4) and 90 percent yellowish red (5YR 5/6) loamy fine sand, 10 percent dark brown (7.5YR 3/3) and 90 percent yellowish red (5YR 4/6), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; very abrupt wavy boundary.

Ab—31 to 35 inches (79 to 89 cm); 10 percent dark gray (7.5YR 4/1) and 90 percent reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3), moist; 30 percent clay; massive; moderately hard, friable, slightly sticky and very plastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

C'1—35 to 41 inches (89 to 104 cm); brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 3/4), moist; 8 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; clear wavy boundary.

C'2—41 to 60 inches (104 to 152 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Aridic Ustorthents have soil properties that vary outside of family class limits.

C1, C2, C3 horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, loamy fine sand

Clay: 1 to 10 percent

Reaction: neutral to moderately alkaline

Ab horizon

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 1 to 6, dry or moist

Texture: clay loam, sandy clay loam
 Clay: 25 to 35 percent
 Reaction: neutral to moderately alkaline

C'1 and C'2 horizons

Hue: 5YR, 7.5YR
 Value: 4 to 7 dry, 3 to 6 moist
 Chroma: 4 or 6, dry or moist
 Texture: fine sand, loamy fine sand
 Clay: 1 to 10 percent
 Reaction: neutral to moderately alkaline

Riverwash

Unstabilized sandy, silty, clayey, or gravelly sediment that is flooded, washed, and reworked frequently by rivers.

37—Pinpoint-Parkwash-Rock outcrop complex, 1 to 10 percent slopes

Map Unit Setting

Landform(s): dune fields
Elevation: 6,300 to 8,200 feet (1,920 to 2,499 meters)
Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)
Mean annual air temperature: 46 to 50 degrees F (8.0 to 10.0 degrees C)
Mean annual soil temperature: 48 to 52 degrees F (9.1 to 11.1 degrees C)
Frost-free period: 120 to 150 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: 35-6AZ Colorado Plateau Pinyon-Juniper Sagebrush

Map Unit Composition

Pinepoint and similar soils: 35 percent
 Parkwash and similar soils: 25 percent
 Rock outcrop: 25 percent
 Minor Components: 15 percent

- Moderately deep and deep Ustic Quartzipsamments
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Pinepoint soils

Taxonomic classification: Mesic, coated Ustic Quartzipsamments
Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields
Parent material: eolian sands derived from sandstone
Slope: 1 to 10 percent
Surface cover:

- Biological crust
 - cyanobacteria: 30 percent
 - lichen: 0 percent
 - moss: 0 percent
- Chemical crust
 - salt: 0 percent
 - gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent
 woody debris: 15 percent
 bare soil: 25 percent
 rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.4 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Upland 13-17" p.z.

Ecological site number: R035XF607AZ

Present vegetation: Wyoming big sagebrush, broom snakeweed, blue grama

Land capability (non irrigated): 6c

Typical Profile**Location**

Geographic Coordinate System:

36° 35' 49.70" north, 110° 31' 55.50" west

C1—0 to 3 inches (0 to 8 cm); brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

C2—3 to 20 inches (8 to 51 cm); strong brown (7.5YR 5/6) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine, and common coarse roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C3—20 to 39 inches (51 to 99 cm); brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

C4—39 to 52 inches (99 to 132 cm); strong brown (7.5YR 5/6) loamy fine sand, brown (7.5YR 4/4), moist; 7 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; very slightly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C5—52 to 60 inches (132 to 152 cm); strong brown (7.5YR 5/6) loamy fine sand, brown (7.5YR 4/4), moist; 7 percent clay; massive; very hard, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; slightly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics**C horizons**

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, loamy fine sand, very fine sand, loamy sand, sand

Clay: 1 to 10 percent

Reaction: neutral to moderately alkaline

Parkwash soils

Taxonomic classification: Mesic, coated Lithic Quartzipsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 2 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 5 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 20 percent

woody debris: 5 percent

bare soil: 75 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.1 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Pinus edulis/Artemisia tridentata ssp. wyomingensis/Bouteloua gracilis

Ecological site number: F035XF621AZ

Present vegetation: Colorado pinyon, Wyoming big sagebrush, blue grama, broom snakeweed

Land capability (non irrigated): 6c

Typical Profile**Location**

Geographic Coordinate System:

36° 36' 3.80" north, 110° 32' 32.90" west

C1—0 to 3 inches (0 to 8 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 4/4), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C2—3 to 8 inches (8 to 20 cm); reddish brown (5YR 5/4) fine sand, reddish brown (5YR 4/4), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C3—8 to 16 inches (20 to 41 cm); reddish brown (5YR 5/4) fine sand, reddish brown (5YR 4/4), moist; 6 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, medium, coarse, and very coarse roots throughout; few

very fine and fine dendritic tubular pores; violently effervescent; strongly alkaline, pH 8.6; abrupt wavy boundary.

R—16 inches (41 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, very fine sand, loamy fine sand

Clay: 3 to 8 percent

Reaction: neutral to moderately alkaline

Rock outcrop

Exposures of steep bedrock and cliffs, which are typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

38—Pocum family-Earlweed complex, 1 to 15 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 5,200 to 5,600 feet (1,585 to 1,707 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Pocum family and similar soils: 60 percent

Earlweed and similar soils: 30 percent

Minor Components: 10 percent

- Needle and similar soils
- Rock outcrop
- Active dunes and sand sheets

Soil Properties and Qualities

Pocum family soils

Taxonomic classification: Loamy, mixed, superactive, mesic, shallow Calcic Petrocalcids

Geomorphic position: occurs on structural benches and ledges on mesa summits

Parent material: eolian deposits derived from sandstone

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 1 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 25 percent
 woody debris: 25 percent
 bare soil: 50 percent
 rock fragments

- gravel: 40 percent
- cobble: 3 percent
- stone: 2 percent

Depth to restrictive feature(s): 10 to 20 inches to petrocalcic; 15 to 40 inches to petrocalcic
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.01 to 0.42 micrometers per second)
Available water capacity total inches: 2.1 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: medium
Hydrologic group: D
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: blackbrush, fourwing saltbush, galleta, longleaf Mormon tea, prickly Russian thistle, pricklypear and cholla
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 46' 41.30" north, 111° 32' 8.20" west

C—0 to 9 inches (0 to 23 cm); yellowish red (5YR 4/6) loamy fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; single grain; loose, nonsticky and nonplastic; many very fine roots throughout; few fine and medium carbonate nodules in matrix; 2 percent gravel; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

Bk—9 to 19 inches (23 to 48 cm); reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots throughout; common very fine and fine irregular pores; common coarse carbonate nodules in matrix; 7 percent gravel and 1 percent cobble; violently effervescent, 15 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; very abrupt smooth boundary.

Bkkm1—19 to 37 inches (48 to 94 cm); white (10YR 8/1), white (10YR 8/1), moist; violently effervescent, 20 percent calcium carbonate equivalent; cemented material, calcium carbonate cemented hardpan, 1 to 2 centimeter laminar cap; clear smooth boundary.

Bkkm2—37 to 60 inches (94 to 152 cm); white (10YR 8/1), white (10YR 8/1), moist; violently effervescent, 20 percent calcium carbonate equivalent; cemented material, calcium carbonate cemented hardpan.

Range in Characteristics

Pocum family differs from the series because the series is greater than 60 inches to bedrock and has 15 to 30 percent rock fragments.

C horizon

Hue: 5YR, 7.5YR
 Value: 4 or 5 dry, 3 to 6 moist
 Chroma: 4 or 6, dry or moist
 Texture: fine sand, fine sandy loam, loamy fine sand, sand
 Clay: 1 to 6 percent
 Reaction: moderately alkaline or strongly alkaline

Bk horizon

Hue: 5YR, 7.5YR
 Value: 4 or 5 dry, 3 to 5 moist
 Chroma: 4 or 6, dry or moist
 Texture: fine sand, loamy fine sand, fine sandy loam
 Clay: 2 to 8 percent
 Reaction: moderately alkaline or strongly alkaline
 Calcium carbonate equivalent: 5 to 25 percent

Bkkm horizons

Value: 6 to 8 moist
 Chroma: 1 or 2, dry or moist
 Reaction: moderately alkaline or strongly alkaline
 Calcium carbonate equivalent: 10 to 30 percent

Petrocalcic horizon—the zone from 19 to 60 inches (Bkkm horizons)

Some pedons do not have a Bk horizon.

Earlweed soils

Taxonomic classification: Sandy, mixed, mesic Ustic Haplocalcids

Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits

Parent material: eolian deposits derived from sandstone

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent
 woody debris: 3 percent
 bare soil: 57 percent
 rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: yucca, blackbrush, cheatgrass, galleta, longleaf Mormon tea, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 47' 59.40" north, 111° 18' 28.90" west

C—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 5/6) sand, strong brown (7.5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; 1 percent gravel; strongly effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Bk1—2 to 35 inches (5 to 89 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; common medium carbonate masses and nodules in matrix; 1 percent gravel; violently effervescent, 8 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk2—35 to 60 inches (89 to 152 cm); yellowish red (5YR 5/8) sand, strong brown (7.5YR 5/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; common coarse carbonate masses in matrix; 1 percent stone; violently effervescent, 8 percent calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

C horizon

Hue: 5YR, 7.5YR

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, fine sandy loam

Clay: 1 to 10 percent

Reaction: moderately alkaline or strongly alkaline

Bk horizons

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 4 to 8, dry or moist

Texture: sand, fine sand, loamy fine sand, fine sandy loam

Clay: 1 to 10 percent

Calcium carbonate equivalent: 5 to 15 percent

Calcic horizon—the zone from 2 to 60 inches (Bk horizons)

39—Reef-Mido-Zukan complex, 2 to 35 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 6,230 to 7,010 feet (1,900 to 2,137 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Reef and similar soils: 50 percent

Mido and similar soils: 20 percent

Zukan and similar soils: 20 percent

Minor Components: 10 percent

- Tekapo and similar soils
- Pinepoint and similar soils
- Rock outcrop
- Riverwash

Soil Properties and Qualities

Reef soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic

Lithic Ustic Torriorthents

Geomorphic position: occurs on structural benches and ledges on mesa escarpments

Parent material: residuum weathered from sandstone and shale

Slope: 2 to 35 percent

Surface cover:

Biological crust

cyanobacteria: 10 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 10 percent

bare soil: 30 percent

rock fragments

- channer: 30 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.0 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Stansbury cliffrose, Utah juniper, Wyoming big sagebrush, pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 23' 53.30" north, 110° 37' 5.70" west

C1—0 to 3 inches (0 to 8 cm); brown (7.5YR 5/4) channery sandy loam, brown (7.5YR 4/4), moist; 14 percent clay; single grain; soft, very friable, nonsticky and nonplastic; common fine roots throughout; few very fine tubular pores; 30 percent channer; strongly effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

C2—3 to 11 inches (8 to 28 cm); brown (7.5YR 5/4) very channery sandy loam, brown (7.5YR 4/4), moist; 18 percent clay; massive; soft, friable, nonsticky and nonplastic; few very fine roots around fragments; common very fine vesicular pores; 40 percent channer; violently effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

C3—11 to 14 inches (28 to 36 cm); brown (7.5YR 5/4) very channery sandy loam, brown (7.5YR 4/4), moist; 18 percent clay; massive; soft, friable, nonsticky and nonplastic; few very fine roots in cracks and few fine roots around fragments; few fine tubular pores; 40 percent channer; violently effervescent; slightly alkaline, pH 7.6; clear smooth boundary.

R—14 inches (36 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 7.5YR, 5YR

Value: 5 or 6 dry, 4 or 6 moist

Chroma: 3 to 6, dry or moist

Texture: sandy loam, fine sandy loam, sandy clay loam

Clay: 10 to 24 percent

Reaction: neutral to moderately alkaline

Rock fragments: 35 to 50 percent channers

Mido soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits

Parent material: eolian sands derived from sandstone

Slope: 2 to 20 percent

Surface cover:

Biological crust

cyanobacteria: 10 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 10 percent

bare soil: 60 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Stansbury cliffrose, Utah juniper, Wyoming big sagebrush, yucca, pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 25' 32.40" north, 110° 39' 40.30" west

C1—0 to 3 inches (0 to 8 cm); light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4), moist; 4 percent clay; single grain; soft, loose, nonsticky and nonplastic; many very fine roots throughout; slightly effervescent; slightly alkaline, pH 7.6; gradual smooth boundary.

C2—3 to 60 inches (8 to 152 cm); reddish yellow (7.5YR 6/6) fine sand, strong brown (7.5YR 5/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and few coarse roots throughout; strongly effervescent; slightly alkaline, pH 7.8; gradual smooth boundary.

Range in Characteristics

C horizons

Value: 5 or 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy fine sand

Clay: 2 to 6 percent

Reaction: neutral or slightly alkaline

Zukan soils

Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents

Geomorphic position: occurs on structural benches and ledges on mesa escarpments

Parent material: alluvium derived from sandstone and/or colluvium derived from sandstone and shale and/or residuum weathered from sandstone and shale

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 10 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 10 percent

bare soil: 20 percent

rock fragments

- channer: 40 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.8 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Colorado pinyon, Utah juniper, Wyoming big sagebrush, broom snakeweed, shadscale saltbush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 23' 5.00" north, 110° 35' 49.90" west

A—0 to 2 inches (0 to 5 cm); reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4), moist; 30 percent clay; weak fine granular structure; loose, friable, moderately sticky and moderately plastic; few very fine roots throughout; 14 percent channer; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

Bk—2 to 8 inches (5 to 20 cm); pale brown (10YR 6/3) clay loam, brown (10YR 5/3), moist; 31 percent clay; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; few very fine roots throughout; common very fine tubular pores; few fine carbonate masses in matrix; 10 percent channer; violently effervescent, 1 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear smooth boundary.

C—8 to 11 inches (20 to 28 cm); light yellowish brown (2.5Y 6/3) channery clay loam, brown (10YR 5/3), moist; 30 percent clay; weak fine platy structure; slightly hard, friable, moderately sticky and moderately plastic; few very fine, fine, and coarse roots around fragments; few very fine irregular pores; 34 percent channer; violently effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

R—11 inches (28 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

A horizon

Texture: fine sandy loam, sandy loam, sandy clay loam, clay loam

Clay: 15 to 32 percent

Rock fragments: 10 to 25 percent

Reaction: moderately alkaline or strongly alkaline

Bk horizon

Hue: 10YR, 7.5YR, 5YR

Value: 5 or 6 dry, 4 or 5 moist

Chroma: 3 or 4, dry or moist

Texture: sandy loam, sandy clay loam, loam, clay loam

Clay: 18 to 32 percent

Calcium carbonate equivalent: 0 to 4 percent

Reaction: moderately alkaline or strongly alkaline

C horizon

Hue: 10YR, 2.5Y

Chroma: 3 or 4, dry or moist

Texture: sandy loam, sandy clay loam, channery clay loam, clay loam

Clay: 20 to 32 percent

Reaction: moderately alkaline or strongly alkaline

Rock fragments: 10 to 35 percent

40—Riverwash-Sheppard complex, 0 to 24 percent slopes

Map Unit Setting

Landform(s): dune fields

Elevation: 4,200 to 4,500 feet (1,280 to 1,372 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Riverwash: 60 percent

Sheppard and similar soils: 30 percent

Minor Components 10 percent:

- Typic Torrifluvents
- Typic Haplocambids
- Active dunes and sand sheets

Soil Properties and Qualities

Riverwash

Unstabilized sandy, silty, clayey, or gravelly sediment that is flooded, washed, and reworked frequently by rivers, and usually is devoid of vegetation.

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on stabilized dunes and sandsheets in dune fields

Parent material: eolian deposits derived from sandstone

Slope: 0 to 24 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 10 percent

woody debris: 1 percent

bare soil: 89 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 5.8 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

Runoff class: low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, prickly Russian thistle, pricklypear and cholla

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 50' 15.50" north, 110° 59' 19.00" west

C1—0 to 5 inches (0 to 13 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common very fine roots throughout; few very fine irregular pores; very slightly effervescent; strongly alkaline, pH 8.8; clear smooth boundary.

C2—5 to 36 inches (13 to 91 cm); yellowish red (5YR 4/6) loamy fine sand, reddish brown (5YR 4/4), moist; 9 percent clay; massive; soft, very friable, nonsticky and slightly plastic; few very fine roots throughout; very slightly effervescent; moderately alkaline, pH 8.0; gradual smooth boundary.

C3—36 to 60 inches (91 to 152 cm); yellowish red (5YR 5/6) loamy fine sand, reddish brown (5YR 4/4), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; very slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

C horizons

Hue: 5YR, 2.5YR

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, loamy fine sand

Clay: 2 to 9 percent

Reaction: slightly alkaline to strongly alkaline

41—Rizno-Wayneco-Rock outcrop complex, 1 to 7 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 5,800 to 6,200 feet (1,767 to 1,889 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Rizno and similar soils: 45 percent

Wayneco and similar soils: 35 percent

Rock outcrop: 10 percent

Minor Components: 10 percent

- Arches and similar soils
- Pensom and similar soils
- Active dunes and sandsheets

Soil Properties and Qualities

Rizno soils

Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents

Geomorphic position: occurs on structural benches and ledges on mesa escarpments

Parent material: residuum weathered from sandstone and/or eolian sands derived from sandstone

Slope: 1 to 7 percent

Surface cover:

Biological crust

cyanobacteria: 5 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 5 percent

bare soil: 50 percent

rock fragments

- gravel: 50 percent

- cobble: 3 percent

- stone: 2 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.3 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, blackbrush, broom snakeweed

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 57' 7.10" north, 110° 28' 7.90" west

C—0 to 3 inches (0 to 8 cm); light reddish brown (5YR 6/4) sandy loam, reddish brown (5YR 5/4), moist; 13 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; few very fine tubular pores; 5 percent gravel; violently effervescent; strongly alkaline, pH 8.6; gradual wavy boundary.

Cn—3 to 9 inches (8 to 23 cm); light reddish brown (5YR 6/4) loam, reddish brown (5YR 5/4), moist; 16 percent clay; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots throughout; few very fine tubular pores; 14

percent gravel; violently effervescent; strongly alkaline, pH 8.8; abrupt smooth boundary.

C'—9 to 11 inches (23 to 28 cm); yellow (10YR 7/6) gravelly sandy loam, brownish yellow (10YR 6/6), moist; 10 percent clay; massive; soft, very friable, nonsticky and nonplastic; few fine roots throughout and few medium roots throughout; common very fine vesicular pores; 30 percent gravel; violently effervescent; strongly alkaline, pH 8.6; abrupt irregular boundary.

R—11 inches (28 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C and Cn horizons

Hue: 10YR, 7.5YR, 5YR, 2.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 3 to 6, dry or moist

Texture: fine sand, loamy fine sand, sandy loam, fine sandy loam, loam

Clay: 5 to 25 percent

Reaction: moderately alkaline or strongly alkaline

Wayneco soils

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Ustic Haplocalcids

Geomorphic position: occurs on eroded shoulders and backslopes of ridges

Parent material: residuum weathered from calcareous sandstone

Slope: 1 to 7 percent

Surface cover:

Biological crust

cyanobacteria: 2 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 5 percent

bare soil: 35 percent

rock fragments

- gravel: 30 percent

- cobble: 10 percent

- stone: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.9 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, yucca, blackbrush, broom snakeweed, pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 57' 20.80" north, 110° 27' 44.50" west

A—0 to 1 inch (0 to 3 cm); light reddish brown (5YR 6/4) gravelly fine sandy loam, reddish brown (5YR 5/4), moist; 10 percent clay; moderate coarse platy structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots throughout; few very fine tubular pores; 10 percent gravel and 5 percent cobble; strongly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

Bk—1 inch to 4 inches (3 to 10 cm); reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4), moist; 12 percent clay; weak very fine granular structure; soft, very friable, slightly sticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine tubular pores; common fine carbonate nodules in matrix; 5 percent gravel; violently effervescent, 4 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

Bkk—4 to 17 inches (10 to 43 cm); 40 percent white (10YR 8/1) and 60 percent very pale brown (10YR 7/3) fine sandy loam, 40 percent light gray (10YR 7/2) and 60 percent light yellowish brown (10YR 6/4), moist; 15 percent clay; moderate coarse angular blocky structure; moderately hard, friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots throughout; common very fine vesicular pores; many extremely coarse carbonate masses in matrix; 5 percent gravel; violently effervescent, 20 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; abrupt irregular boundary.

R—17 inches (43 cm); fractured, unweathered calcareous sandstone bedrock.

Range in Characteristics

A horizon

Hue: 7.5YR, 5YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy fine sand, loamy sand, fine sandy loam, sandy loam, loam

Clay: 4 to 24 percent

Reaction: moderately alkaline or strongly alkaline

Rock fragments: 5 to 15 percent gravel, 0 to 5 percent cobbles

Bk horizon

Hue: 10YR, 5YR

Value: 5 to 7 dry, 4 to 6 moist

Texture: loamy sand, loamy fine sand, fine sandy loam, loam

Clay: 6 to 24 percent

Reaction: moderately alkaline or strongly alkaline

Rock fragments: 0 to 5 percent gravel

Calcium carbonate equivalent: 2 to 4 percent

Bkk horizon

Hue: 10YR, 5YR

Value: 7 or 8 dry, 6 or 7 moist

Chroma: 1 to 4 dry, 2 to 4 moist

Texture: fine sandy loam, sandy loam, loam

Clay: 10 to 20 percent
 Reaction: moderately alkaline or strongly alkaline
 Rock fragments: 5 to 10 percent gravel
 Calcium carbonate equivalent: 15 to 25 percent

Calcic horizon—the zone from 4 to 17 inches (Bkk horizon)

Rock outcrop

Exposures of steep bedrock and cliffs, which are typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

42—Rock outcrop-Mathis-Nalcase complex, 10 to 50 percent slopes

Map Unit Setting

Landform(s): escarpments
Elevation: 4,500 to 6,500 feet (1,372 to 1,981 meters)
Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)
Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Rock outcrop: 65 percent
 Mathis and similar soils: 15 percent
 Nalcase and similar soils: 15 percent
 Minor Components: 5 percent

- Active dunes and sand sheets
- Riverwash
- Gullied land

Soil Properties and Qualities

Rock outcrop

Exposures of steep bedrock and cliffs, which are typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

Mathis soils

Taxonomic classification: Sandy-skeletal, mixed, mesic Ustic Torriorthents
Geomorphic position: occurs on structural benches and ledges on escarpments
Parent material: colluvium derived from sandstone and/or eolian sands derived from sandstone
Slope: 10 to 50 percent
Surface cover:

- Biological crust
 - cyanobacteria: 0 percent
 - lichen: 0 percent
 - moss: 0 percent
- Chemical crust

salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 10 percent
 woody debris: 3 percent
 bare soil: 15 percent
 rock fragments

- channer: 40 percent
- flagstone: 25 percent
- stone: 15 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: excessively drained
Ksat solum: 19.98 to 99.92 inches per hour (141.00 to 705.00 micrometers per second)
Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 1.1 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: medium
Hydrologic group: A
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: Colorado pinyon, Stansbury cliffrose, Utah juniper, broom snakeweed, sandhill muhly
Land capability (irrigated): 6c
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:
 36° 49' 54.20" north, 110° 57' 34.20" west

C1—0 to 3 inches (0 to 8 cm); yellowish red (5YR 5/6) extremely flaggy sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; 40 percent channer and 25 percent flagstone and 15 percent stone; strongly effervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

C2—3 to 12 inches (8 to 30 cm); yellowish red (5YR 5/6) channery sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few very fine and fine dendritic tubular pores; 20 percent channer and 10 percent flagstone; strongly effervescent; moderately alkaline, pH 8.4; gradual irregular boundary.

C3—12 to 26 inches (30 to 66 cm); yellowish red (5YR 5/6) very channery sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; 30 percent channer and 10 percent flagstone; violently effervescent; strongly alkaline, pH 8.6; abrupt irregular boundary.

R—26 inches (66 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C1 horizon

Hue: 5YR, 7.5YR

Value: 4 or 5, dry or moist
 Clay: 1 to 8 percent
 Reaction: slightly alkaline to strongly alkaline
 Rock fragments: 30 to 90 percent

C2 and C3 horizons

Hue: 5YR, 7.5YR
 Value: 4 or 5, dry or moist
 Clay: 1 to 8 percent
 Reaction: slightly alkaline to strongly alkaline
 Rock fragments: 15 to 60 percent

Some pedons have a thin Cr horizon.

Nalcase soils

Taxonomic classification: Siliceous, mesic Lithic Torripsamments

Geomorphic position: occurs on structural benches and ledges on escarpments

Parent material: colluvium derived from sandstone and/or eolian sands derived from sandstone

Slope: 15 to 30 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 20 percent

woody debris: 5 percent

bare soil: 80 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.8 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Pinus edulis-Juniperus osteosperma/Quercus xpauciloba-Purshia stansburiana/Muhlenbergia pungens

Ecological site number: F035XC374AZ

Present vegetation: Colorado pinyon, Utah juniper, wavyleaf oak, Stansbury cliffrose, sandhill muhly, Bigelow sagebrush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 20' 37.80" north, 111° 28' 31.00" west

C1—0 to 3 inches (0 to 8 cm); strong brown (7.5YR 5/6) fine sand, strong brown

(7.5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.2; very abrupt wavy boundary.

C2—3 to 11 inches (8 to 28 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots throughout; few very fine and fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; clear wavy boundary.

R—11 inches (28 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 or 5, dry or moist

Clay: 3 to 8 percent

Reaction: neutral to moderately alkaline

Some pedons have a thin Cr horizon.

43—Rock outcrop-Mido-Mido, loamy substratum complex, 2 to 15 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 5,600 to 6,000 feet (1,707 to 1,829 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Rock outcrop: 55 percent

Mido and similar soils: 25 percent

Mido, loamy substratum and similar soils: 15 percent

Minor Components: 5 percent

- Moenkopie and similar soils
- Pensom and similar soils
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Rock outcrop

Exposures of steep bedrock and cliffs, which are typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

Mido soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on sand sheets on mesa summits

Parent material: eolian sands derived from sandstone

Slope: 2 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 15 percent

woody debris: 5 percent

bare soil: 80 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, Utah juniper, yucca, broom snakeweed, rabbitbrush, sand muhly

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 37' 37.30" north, 111° 4' 58.20" west

C1—0 to 3 inches (0 to 8 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

C2—3 to 8 inches (8 to 20 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; common very fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C3—8 to 60 inches (20 to 152 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 5/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; common medium and coarse roots throughout; common very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 5 to 7, dry or moist

Chroma: 4 to 8, dry or moist

Texture: sand, fine sand

Clay: 2 to 5 percent

Reaction: slightly alkaline or moderately alkaline

Mido, loamy substratum soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on sand sheets on mesa summits

Parent material: eolian sands derived from sandstone over residuum weathered from mudstone

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 2 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 0 percent

bare soil: 70 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Available water capacity total inches: 7.4 (high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, Utah juniper, blackbrush, blue grama, broom snakeweed, dropseed

Land capability (non irrigated): 6c

Typical Profile**Location**

Geographic Coordinate System:

36° 40' 51.10" north, 110° 58' 40.40" west

C1—0 to 3 inches (0 to 8 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C2—3 to 9 inches (8 to 23 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, medium, coarse, and very coarse roots throughout; common very fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C3—9 to 32 inches (23 to 81 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; hard, friable, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; common very fine and medium dendritic tubular pores; violently effervescent; strongly alkaline, pH 8.6; clear smooth boundary.

2Bk—32 to 48 inches (81 to 122 cm); yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6), moist; 26 percent clay; moderate coarse angular blocky

structure; hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine, fine, and medium dendritic tubular pores; common fine carbonate masses in matrix; 2 percent gravel; violently effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear smooth boundary.

2C—48 to 60 inches (122 to 152 cm); red (2.5YR 5/6) fine sandy loam, red (2.5YR 4/6), moist; 12 percent clay; massive; moderately hard, friable, nonsticky and nonplastic; common very fine roots throughout; common very fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 5 to 8 dry, 4 to 8 moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy sand, loamy fine sand

Clay: 3 to 10 percent

Reaction: moderately alkaline or strongly alkaline

2Bk horizon

Hue: 5YR, 10YR

Value: 4 to 6 dry, 3 to 6 moist

Chroma: 3 to 6, dry or moist

Texture: sandy loam, sandy clay loam

Clay: 20 to 26 percent

Reaction: moderately alkaline or strongly alkaline

Calcium carbonate equivalent: 0 to 4 percent

2C horizon

Hue: 2.5YR, 5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist

Texture: sandy loam, fine sandy loam

Clay: 10 to 20 percent

Reaction: moderately alkaline or strongly alkaline

44—Rock outcrop-Needle complex, 2 to 12 percent slopes

Map Unit Setting

Landform(s): escarpments

Elevation: 4,400 to 4,500 feet (1,341 to 1,372 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Rock outcrop: 55 percent

Needle and similar soils: 30 percent

Minor Components: 15 percent

- Sheppard soils on stabilized dunes
- Active dunes and sand sheets

Soil Properties and Qualities

Rock outcrop

Exposures of flat or rolling bedrock, typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

Needle soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments

Geomorphic position: occurs on ledges and structural benches on escarpments

Parent material: eolian sands derived from sandstone

Slope: 2 to 12 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 10 percent

woody debris: 10 percent

bare soil: 80 percent

rock fragments

- gravel: 10 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.8 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Sandstone Rockland 6-10" p.z.

Ecological site number: R035XB255AZ

Present vegetation: Ephedra cutleri, Stansbury cliffrose, blackbrush, broom snakeweed

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 50' 19.40" north, 111° 32' 46.90" west

C1—0 to 2 inches (0 to 5 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C2—2 to 11 inches (5 to 28 cm); yellowish red (5YR 5/8) sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic;

common very fine and fine and few coarse roots throughout; few very fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

R—11 inches (28 cm); slightly effervescent; fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 to 8, dry or moist

Clay: 0 to 15 percent

Reaction: neutral to moderately alkaline

45—Rock outcrop-Needle-Lithic Torriorthents complex, 1 to 25 percent slopes

Map Unit Setting

Landform(s): plateaus

Elevation: 5,140 to 6,250 feet (1,565 to 1,904 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Rock outcrop: 50 percent

Needle and similar soils: 30 percent

Lithic Torriorthents and similar soils: 10 percent

Minor Components: 10 percent

- Similar soils on steeper slopes
- Mido and similar soils
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Rock outcrop

Exposures of bedrock, typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial or colluvial material.

Needle soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments

Geomorphic position: occurs on sand sheets on hills and on structural benches and ledges on hill slopes

Parent material: eolian sands derived from sandstone

Slope: 1 to 20 percent

Surface cover:

Biological crust

cyanobacteria: 35 percent

lichen: 0 percent

moss: 0 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 5 percent
 woody debris: 1 percent
 bare soil: 60 percent
 rock fragments: 0 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very low
Hydrologic group: D
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: Colorado pinyon, Indian ricegrass, Stansbury cliffrose, blue grama, broom snakeweed, narrowleaf yucca, pricklypear and cholla
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 44' 33.30" north, 110° 16' 12.40" west

C1—0 to 7 inches (0 to 18 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; few fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C2—7 to 13 inches (18 to 33 cm); reddish yellow (5YR 6/6) fine sand, reddish yellow (5YR 6/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots throughout; few very fine dendritic tubular pores; few very fine carbonate masses in matrix; slightly effervescent; moderately alkaline, pH 8.2; abrupt irregular boundary.

2R—13 inches (33 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist

Clay: 1 to 10 percent

Reaction: neutral to moderately alkaline

Lithic Torriorthents soils

Taxonomic classification: Lithic Torriorthents

Geomorphic position: occurs on ledges and structural benches on hill slopes

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 1 to 25 percent

Surface cover:

Biological crust

cyanobacteria: 3 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 5 percent

woody debris: 10 percent

bare soil: 90 percent

rock fragments

- gravel: 3 percent

Depth to restrictive feature(s): 14 to 20 inches to bedrock, paralithic; 14 to 20 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 5.95 to 19.98 inches per hour (42.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.6 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Colorado pinyon, Indian ricegrass, Stansbury cliffrose, blue grama, broom snakeweed, narrowleaf yucca, pricklypear and cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 44' 17.00" north, 110° 15' 52.40" west

C1—0 to 7 inches (0 to 18 cm); yellowish red (5YR 5/6) fine sand, reddish brown (5YR 4/4), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots throughout; few fine and medium dendritic tubular pores; 5 percent channer; noneffervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

2C2—7 to 10 inches (18 to 25 cm); red (2.5YR 5/6) extremely channery loamy fine sand, red (2.5YR 4/6), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots around fragments; few fine dendritic tubular pores; 75 percent channer; violently effervescent; strongly alkaline, pH 8.6; abrupt irregular boundary.

2C3—10 to 14 inches (25 to 36 cm); red (2.5YR 5/6) extremely channery loamy fine sand, red (2.5YR 4/6), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots around fragments; few fine dendritic tubular pores; 80

percent channer; violently effervescent; strongly alkaline, pH 8.6; abrupt irregular boundary.

Cr—14 to 16 inches (36 to 41 cm); fractured, weathered sandstone and mudstone bedrock.

R—16 inches (41 cm); fractured, unweathered sandstone and mudstone bedrock.

Range in Characteristics

Lithic Torriorthents have soil properties that vary outside of family class limits.

C horizons

Hue: 2.5YR, 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 or 6, dry or moist

Clay: 1 to 10 percent

Reaction: neutral to moderately alkaline

Rock fragments: 0 to 80 percent

46—Sandoval family-Ustic Haplocambids complex, 0 to 5 percent slopes

Map Unit Setting

Landform(s): playas

Elevation: 5,400 to 5,500 feet (1,646 to 1,676 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Sandoval family and similar soils: 45 percent

Ustic Haplocambids and similar soils: 45 percent

Minor Components: 10 percent

- Typic Haplocalcids
- Mespuen and similar soils

Soil Properties and Qualities

Sandoval family soils

Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic, shallow Ustic Torriorthents

Geomorphic position: occurs on playas

Parent material: eolian sands derived from sandstone over lacustrine deposits over residuum weathered from sandstone

Slope: 0 to 2 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 5 percent

woody debris: 5 percent

bare soil: 95 percent

rock fragments

- gravel: 10 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, densic

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Available water capacity total inches: 3.1 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: negligible

Hydrologic group: D

Ecological site name: Clay Loam Swale 10-14" p.z. Limy, Shallow

Ecological site number: R035XC316AZ

Present vegetation: broom snakeweed, galleta

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 23' 36.50" north, 111° 24' 33.80" west

Cn1—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 5/6) clay loam, strong brown (7.5YR 4/6), moist; 35 percent clay; single grain; loose, nonsticky and very plastic; few very fine roots throughout; strongly effervescent; strongly alkaline, pH 8.8; abrupt wavy boundary.

Cn2—2 to 11 inches (5 to 28 cm); yellowish red (5YR 4/6) clay, yellowish red (5YR 4/6), moist; 45 percent clay; moderate medium prismatic structure; hard, very friable, slightly sticky and very plastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; very few distinct pressure faces and very few carbonate coats on surfaces along pores and on rock fragments; strongly effervescent; very strongly alkaline, pH 9.2; abrupt wavy boundary.

2C—11 to 19 inches (28 to 48 cm); strong brown (7.5YR 5/6) sandy clay loam, yellowish red (5YR 5/6), moist; 20 percent clay; pinkish white (7.5YR 8/2) mottles; massive; very hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; few very fine dendritic tubular pores; very few carbonate coats on surfaces along pores; slightly effervescent; strongly alkaline, pH 8.6; clear irregular boundary.

2Cdn—19 inches (48 cm); reddish yellow (7.5YR 6/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; hard, very friable, nonsticky and nonplastic; few very fine dendritic tubular pores; few carbonate coats on surfaces along root channels and on rock fragments; slightly effervescent; strongly alkaline, pH 9.0; clear irregular boundary.

Range in Characteristics

Sandoval family differs from the official series because the series has a paralithic contact and 18 to 35 percent clay in the particle size control section.

Cn horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist
 Chroma: 4 or 6, dry or moist
 Texture: clay, clay loam, sandy clay, sandy clay loam
 Clay: 30 to 50 percent

2C horizon

Hue: 5YR, 7.5YR
 Value: 4 to 6 dry, 3 to 5 moist
 Chroma: 4 or 6, dry or moist
 Texture: sandy clay loam, fine sandy loam
 Clay: 15 to 30 percent
 Reaction: moderately alkaline or strongly alkaline

2Cdn horizon

Hue: 5YR, 7.5YR, 10YR
 Value: 4 to 7 dry, 3 to 6 moist
 Chroma: 4 or 6, dry or moist
 Texture: fine sand, sand, loamy sand
 Clay: 2 to 7 percent

Ustic Haplocambids soils

Taxonomic classification: Ustic Haplocambids

Geomorphic position: occurs on playas

Parent material: eolian sands derived from sandstone over lacustrine deposits over residuum weathered from sandstone

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent
 woody debris: 5 percent
 bare soil: 80 percent
 rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Available water capacity total inches: 8.9 (high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: negligible

Hydrologic group: C

Ecological site name: Clay Loam Upland 10-14" p.z. Limy

Ecological site number: R035XC335AZ

Present vegetation: galleta, broom snakeweed, winterfat

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 23' 37.00" north, 111° 24' 1.60" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4), moist; 30 percent clay; weak thick platy structure; moderately hard, very friable, nonsticky and moderately plastic; few very fine and common fine roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C—3 to 10 inches (8 to 25 cm); reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4), moist; 30 percent clay; massive; slightly hard, very friable, nonsticky and moderately plastic; few very fine and fine roots throughout; common very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk—10 to 28 inches (25 to 71 cm); reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4), moist; 40 percent clay; weak coarse angular blocky parting to moderate medium prismatic structure; very hard, very friable, nonsticky and very plastic; common very fine and few fine roots throughout; common very fine dendritic tubular pores; common medium carbonate masses in matrix; violently effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

2C—28 to 34 inches (71 to 86 cm); reddish yellow (7.5YR 6/6) fine sand, strong brown (7.5YR 5/6), moist; 6 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; few fine dendritic tubular pores; common medium carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.6; very abrupt wavy boundary.

2Bk—34 to 43 inches (86 to 109 cm); reddish brown (5YR 5/4) clay loam, yellowish red (5YR 4/6), moist; 30 percent clay; yellowish red (5YR 5/6) mottles; weak medium prismatic parting to weak medium angular blocky structure; very hard, friable, slightly sticky and moderately plastic; few very fine roots between peds; many very fine and few fine dendritic tubular pores; few fine carbonate coats on surfaces along root channels and many coarse carbonate masses in matrix; violently effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; abrupt irregular boundary.

3C—43 to 45 inches (109 to 114 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 7 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.6; abrupt wavy boundary.

3Bkn—45 to 53 inches (114 to 135 cm); light reddish brown (5YR 6/4) clay loam, reddish brown (5YR 5/4), moist; 35 percent clay; moderate medium prismatic parting to moderate fine angular blocky structure; very hard, very friable, nonsticky and moderately plastic; few very fine roots between peds; common very fine dendritic tubular pores; many coarse carbonate masses in matrix; violently effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.8; abrupt wavy boundary.

4Cn—53 to 60 inches (135 to 152 cm); yellowish red (5YR 5/6) loamy fine sand, brown (7.5YR 5/4), moist; 10 percent clay; massive; very hard, very friable, nonsticky and nonplastic; common very fine dendritic tubular pores; common fine carbonate masses in matrix; strongly effervescent; strongly alkaline, pH 9.0.

Range in Characteristics

Ustic Haplocambids have soil properties that vary outside of family class limits.

A, C, and 2C horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist
 Texture: clay loam, clay, sandy clay, sandy clay loam
 Clay: 25 to 45 percent
 Reaction: moderately alkaline or strongly alkaline

Bk, 2Bk, and 3Bkn horizon

Hue: 5YR, 7.5YR
 Value: 4 to 7 dry, 3 to 6 moist
 Chroma: 4 or 6, dry or moist
 Texture: clay, clay loam, sandy clay, sandy clay loam
 Clay: 25 to 45 percent
 Reaction: moderately alkaline or strongly alkaline
 Calcium carbonate equivalent: 0 to 4 percent

3C and 4Cn horizons

Hue: 5YR, 7.5YR, 10YR
 Value: 4 to 7 dry, 3 to 6 moist
 Chroma: 2 to 6, dry or moist
 Texture: fine sand, sand, fine sandy loam, loamy fine sand
 Clay: 4 to 12 percent
 Reaction: moderately alkaline or strongly alkaline

Cambic horizon—the zone from 10 to 28 inches (Bk horizon)

47—Sanfeco-Sheppard complex, 1 to 3 percent slopes

Map Unit Setting

Landform(s): alluvial fans, sand sheets
Elevation: 5,650 to 5,800 feet (1,722 to 1,768 meters)
Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Sanfeco and similar soils: 60 percent
 Sheppard and similar soils: 30 percent
 Minor Components: 10 percent
 • Soils with calcic horizons

Soil Properties and Qualities

Sanfeco soils

Taxonomic classification: Fine, mixed, superactive, mesic Vertic Haplargids
Geomorphic position: occurs on stream terraces and alluvial flats on an alluvial fan
Parent material: alluvium derived from mixed
Slope: 1 to 3 percent
 Biological crust
 cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent
 Chemical crust

salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 10 percent
woody debris: 10 percent
bare soil: 80 percent
rock fragments: 0 percent
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Available water capacity total inches: 10.2 (very high)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: low
Hydrologic group: C
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: broom snakeweed, globemallow, prickly Russian thistle
Land capability (irrigated): 2e
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 42' 43.14" north, 110° 16' 16.68" west

A1—0 to 4 inches (0 to 10 cm); strong brown (7.5YR 4/6) stratified clay loam to loamy sand to fine sand to clay, dark brown (7.5YR 3/4), moist; 35 percent clay; moderate very thick platy and moderate thick platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium and few coarse roots throughout; few very fine and fine tubular pores; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

A2—4 to 7 inches (10 to 18 cm); brown (7.5YR 4/4) stratified clay loam to loamy sand to fine sand, dark brown (7.5YR 3/4), moist; 35 percent clay; weak thick platy parting to moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine, medium, and coarse roots throughout; common very fine and fine, and few medium and coarse tubular pores; strongly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

A3—7 to 12 inches (18 to 30 cm); brown (7.5YR 4/3) stratified clay loam to loamy sand to fine sand, dark brown (7.5YR 3/3), moist; 35 percent clay; weak thick platy structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine and few fine, medium, and coarse roots throughout; common very fine and few fine, medium, and coarse tubular pores; strongly effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Bt—12 to 21 inches (30 to 53 cm); brown (7.5YR 5/4) clay, dark brown (7.5YR 3/4), moist; 45 percent clay; weak coarse prismatic parting to weak coarse angular blocky; hard, friable, moderately sticky and moderately plastic; common very fine and few fine and medium roots throughout; common very fine and few fine and medium tubular pores; very few distinct clay films on all faces of peds; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Btss1—21 to 33 inches (53 to 84 cm); reddish brown (5YR 5/4) clay, dark reddish brown (5YR 3/4), moist; 50 percent clay; weak coarse prismatic parting to moderate coarse angular blocky; hard, firm, very sticky and very plastic; few very fine and fine

roots throughout; few very fine and fine tubular pores; very few distinct slickensides (pedogenic), very few distinct pressure faces, and very few distinct clay films; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Btss2—33 to 46 inches (84 to 117 cm); reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3), moist; 55 percent clay; moderate coarse prismatic parting to strong medium angular blocky; hard, firm, very sticky and very plastic; few very fine roots throughout; few very fine tubular pores; very few distinct slickensides (pedogenic), very few distinct pressure faces, and very few distinct clay films; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Btssy—46 to 65 inches (117 to 165 cm); reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3), moist; 55 percent clay; strong medium angular blocky and strong coarse angular blocky structure; hard, firm, very sticky and very plastic; few very fine roots throughout; few very fine tubular pores; very few distinct slickensides (pedogenic), very few distinct pressure faces, and very few distinct clay films; few fine and medium gypsum masses throughout; strongly effervescent, 3 percent gypsum; moderately alkaline, pH 8.4.

Range in Characteristics

Sanfeco as used in this survey is a taxadjunct to the series because it displays vertic properties of slickensides and high shrink-swell potential. Sanfeco series is a Fine, mixed, superactive, mesic Typic Haplargids.

A horizons

Value: 4 or 5 dry, 3 to 6 moist

Chroma: 3 to 6, dry or moist

Texture: stratified clay loam, clay, sandy clay loam stratified with thin strata of loamy sand and fine sand

Clay: 28 to 40 percent

Reaction: moderately alkaline or strongly alkaline

Bt and Btss horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 6 moist

Chroma: 3 or 4, dry or moist

Texture: clay loam, clay, sandy clay loam

Clay: 30 to 60 percent

Reaction: moderately alkaline or strongly alkaline

Slickensides: none to few

Cracks: less than 1 millimeter wide, commonly filled with sand

Btssy horizon

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 6 moist

Chroma: 3 or 4, dry or moist

Texture: clay loam, clay, sandy clay loam

Clay: 30 to 60 percent

Reaction: moderately alkaline or strongly alkaline

Slickensides: few to common

Gypsum: 2 to 5 percent

Argillic horizon—the zone of from 12 to 65 inches (Bt, Btss, Btssy horizons)

Btssy horizons are not present in all pedons.

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on sand sheets

Parent material: alluvium derived from mixed

Slope: 1 to 3 percent

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 10 percent

 woody debris: 15 percent

 bare soil: 75 percent

 rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 5.1 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: broom snakeweed, prickly Russian thistle

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 42' 44.40" north, 110° 16' 23.74" west

A—0 to 3 inches (0 to 8 cm); reddish brown (5YR 5/4) loamy sand, dark reddish brown (5YR 3/4), moist; 5 percent clay; moderate thick platy structure; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium and coarse roots throughout; few very fine and fine tubular pores; strongly effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bw1—3 to 14 inches (8 to 36 cm); reddish brown (5YR 5/4) loamy sand, reddish brown (5YR 4/4), moist; 6 percent clay; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine, medium, and coarse roots throughout; common very fine and few fine, medium, and coarse tubular pores; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

Bw2—14 to 23 inches (36 to 58 cm); reddish brown (5YR 5/4) loamy sand, dark reddish brown (5YR 3/4), moist; 7 percent clay; weak medium angular blocky and weak coarse angular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine, fine, and medium tubular pores; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

Bkn—23 to 36 inches (58 to 91 cm); reddish brown (5YR 5/4) loamy fine sand, dark reddish brown (5YR 3/4), moist; 8 percent clay; weak coarse angular blocky and weak medium angular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine tubular pores; few fine and medium carbonate masses in matrix; strongly effervescent, 2

percent calcium carbonate equivalent; strongly alkaline, pH 8.8; clear smooth boundary.

Bk—36 to 60 inches (91 to 152 cm); reddish brown (5YR 5/4) loamy fine sand, dark reddish brown (5YR 3/4), moist; 9 percent clay; weak coarse angular blocky and weak medium angular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; common very fine and fine and few medium tubular pores; few fine carbonate masses in matrix; strongly effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6.

Range in Characteristics

A horizon

Hue: 5YR, 7.5YR

Value: 4 or 5 dry, 3 or 4 moist

Chroma: 3 or 6, dry or moist

Texture: loamy sand, loamy fine sand, fine sandy loam, sandy loam, very fine sandy loam

Clay: 5 to 20 percent

Reaction: moderately alkaline or strongly alkaline

Bw horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, loamy fine sand

Clay: 5 to 10 percent

Reaction: moderately alkaline or strongly alkaline

Bkn and Bk horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, loamy fine sand

Clay: 5 to 20 percent

Reaction: moderately alkaline or strongly alkaline

Sodium adsorption ratio: 6 to 10

Calcium carbonate equivalent: 0 to 4 percent

Bkn horizons are not present in all pedons.

48—Santrick-Nalcase-Rock outcrop complex, 1 to 15 percent slopes

Map Unit Setting

Landform(s): dune fields, structural benches

Elevation: 5,700 to 6,400 feet (1,737 to 1,951 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Santrick and similar soils: 50 percent

Nalcase and similar soils: 25 percent

Rock outcrop: 10 percent

Minor Components: 15 percent

- Mespuen and similar soils
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Santrick soils

Taxonomic classification: Siliceous, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields and on structural benches

Parent material: eolian sands derived from sandstone

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 2 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 12 percent

bare soil: 60 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.6 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: Sandy Upland 10-14" p.z.

Ecological site number: R035XC315AZ

Present vegetation: sand sagebrush, Cutler Mormon tea, sand buckwheat, sandhill muhly, blue grama

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 35' 4.00" north, 111° 28' 26.00" west

C1—0 to 2 inches (0 to 5 cm); reddish yellow (7.5YR 6/6) fine sand, strong brown (7.5YR 4/6), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few fine roots throughout; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

C2—2 to 7 inches (5 to 18 cm); 10 percent light brown (7.5YR 6/4) and 90 percent brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine roots throughout; few fine and medium dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C3—7 to 16 inches (18 to 41 cm); brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots throughout; few fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

2C4—16 to 23 inches (41 to 58 cm); brown (7.5YR 5/4) fine sand, strong brown (7.5YR 4/6), moist; 6 percent clay; massive; moderately hard, very friable, nonsticky and nonplastic; few fine, medium, and coarse roots throughout; few fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; very abrupt irregular boundary.

2R—23 inches (58 cm); noneffervescent; fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 7.5YR, 10YR

Value: 4 to 7, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy fine sand

Clay: 2 to 12 percent

Reaction: neutral to moderately alkaline

Nalcase soils

Taxonomic classification: Siliceous, mesic Lithic Torripsamments

Geomorphic position: occurs on sand sheets in dune fields

Parent material: eolian sands derived from sandstone

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 5 percent

bare soil: 70 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic; 5 to 17 inches to bedrock, densic

Drainage class: somewhat excessively drained

Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.5 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Sandstone Upland 10-14" p.z.

Ecological site number: R035XC314AZ

Present vegetation: blue grama, Utah juniper, sandhill muhly

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 29' 16.20" north, 111° 27' 59.00" west

C1—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C2—2 to 4 inches (5 to 10 cm); 10 percent light brown (7.5YR 6/3) and 90 percent strong brown (7.5YR 4/6) fine sand, reddish brown (5YR 4/4), moist; 7 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and few fine roots throughout; few very fine dendritic tubular pores; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

C3—4 to 7 inches (10 to 18 cm); strong brown (7.5YR 4/6) fine sand, reddish brown (5YR 4/4), moist; 4 percent clay; massive; moderately hard, friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

2Cd—7 to 10 inches (18 to 25 cm); brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4), moist; 3 percent clay; massive; hard, firm, nonsticky and nonplastic; noneffervescent; slightly alkaline, pH 7.4; very abrupt wavy boundary.

2R—10 inches (25 cm); noneffervescent; fractured, unweathered sandstone bedrock.

Range in Characteristics

C and Cd horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, sand

Clay: 2 to 8 percent

Reaction: neutral or slightly alkaline

Some pedons do not have a Cd horizon.

Rock outcrop

Exposures of flat or rolling bedrock, typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

49—Sheppard fine sand, 1 to 5 percent slopes

Map Unit Setting

Landform(s): dune fields

Elevation: 4,400 to 4,600 feet (1,341 to 1,402 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Sheppard and similar soils: 85 percent

Minor Components: 15 percent

- Sheppard soils on greater than 5 percent slopes
- Needle soils
- Active dunes and sand sheets

Soil Properties and Qualities

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on dunes and sand sheets on dune fields

Parent material: eolian sands derived from sandstone and/or alluvium derived from sandstone

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 3 percent

bare soil: 75 percent

rock fragments

- gravel: 1 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: negligible

Hydrologic group: A

Ecological site name: Sandy Upland 6-10" p.z.

Ecological site number: R035XB217AZ

Present vegetation: sand sagebrush, Ephedra cutleri, blackbrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 52' 22.70" north, 111° 28' 56.40" west

C1—0 to 2 inches (0 to 5 cm); reddish yellow (5YR 6/6) fine sand, strong brown

(7.5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

C2—2 to 15 inches (5 to 38 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C3—15 to 51 inches (38 to 130 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few fine and medium dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C4—51 to 60 inches (130 to 152 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 5/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine and medium dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 to 8, dry or moist

Texture: loamy sand, fine sand, loamy fine sand

Clay: 2 to 4 percent

Reaction: neutral to moderately alkaline

50—Sheppard sand, 5 to 15 percent slopes

Map Unit Setting

Landform(s): dune fields

Elevation: 4,300 to 4,600 feet (1,311 to 1,402 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Sheppard and similar soils: 90 percent

Minor Components: 10 percent

- Sheppard soils on less than 5 percent slopes
- Needle soils
- Active dunes and sand sheets

Soil Properties and Qualities

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on dunes and sand sheets on dune fields

Parent material: eolian sands derived from sandstone

Slope: 5 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 2 percent

bare soil: 75 percent

rock fragments

- gravel: 2 percent

Depth to restrictive feature(s): 60 to 72 inches to bedrock, lithic*Drainage class:* excessively drained*Ksat solum:* 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)*Ksat restrictive layer:* 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)*Available water capacity total inches:* 4.2 (low)*Shrink-swell potential:* about 1.5 LEP (low)*Flooding hazard:* none*Runoff class:* very low*Hydrologic group:* A*Ecological site name:* Sandy Upland 6-10" p.z. Limy Subsurface*Ecological site number:* R035XB206AZ*Present vegetation:* Ephedra cutleri, Machaeranthera, blackbrush, narrowleaf yucca, sand dropseed*Land capability (non irrigated):* 7c**Typical Profile***Location*

Geographic Coordinate System:

36° 52' 3.50" north, 111° 28' 12.20" west

C1—0 to 3 inches (0 to 8 cm); strong brown (7.5YR 5/6) sand, strong brown (7.5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

C2—3 to 12 inches (8 to 30 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C3—12 to 56 inches (30 to 142 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

C4—56 to 60 inches (142 to 152 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; few fine dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.2; abrupt irregular boundary.

R—60 inches (152 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 to 8, dry or moist

Texture: sand, fine sand, loamy sand, loamy fine sand

Clay: 2 to 5 percent

Reaction: slightly alkaline to strongly alkaline

51—Sheppard-Massadona-Monue complex, 0 to 10 percent slopes

Map Unit Setting

Landform(s): dune fields, fan remnants

Elevation: 5,090 to 5,700 feet (1,552 to 1,737 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Sheppard and similar soils: 35 percent

Massadona and similar soils: 30 percent

Monue and similar soils: 25 percent

Minor Components: 10 percent

- Lithic Torriorthents
- Soils in a fine-loamy particle size class
- Rock outcrop
- Active sand dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on stabilized dunes in dune fields

Parent material: eolian sands derived from sandstone

Slope: 0 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 2 percent

bare soil: 73 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, yucca, broom snakeweed, galleta, longleaf

Mormon tea, pricklypear and cholla, rabbitbrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 41' 58.50" north, 109° 47' 25.80" west

C1—0 to 1 inch (0 to 3 cm); strong brown (7.5YR 5/8) sand, strong brown (7.5YR 5/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—1 inch to 34 inches (3 to 86 cm); strong brown (7.5YR 5/8) sand, strong brown (7.5YR 5/6), moist; 2 percent clay; massive; loose, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.4; gradual smooth boundary.

C3—34 to 60 inches (86 to 152 cm); reddish yellow (7.5YR 6/8) fine sand, strong brown (7.5YR 5/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 4 to 8, dry or moist

Texture: sand, very fine sand, fine sand

Clay: 2 to 7 percent

Reaction: moderately alkaline or strongly alkaline

Massadona soils

Taxonomic classification: Fine, mixed, superactive, mesic Typic Haplocambids

Geomorphic position: occurs on stream terraces on fan remnants

Parent material: eolian sands derived from sandstone over alluvium derived from mudstone

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 3 percent
woody debris: 0 percent
bare soil: 97 percent
rock fragments: 0 percent
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Available water capacity total inches: 9.9 (high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: negligible
Hydrologic group: C
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: prickly Russian thistle
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:
36° 41' 13.10" north, 109° 46' 35.60" west

Cn—0 to 1 inch (0 to 3 cm); red (2.5YR 5/6) clay, red (2.5YR 4/6), moist; 45 percent clay; massive; soft, very friable, moderately sticky and very plastic; few very fine and fine roots throughout; few fine carbonate masses in matrix; violently effervescent; very strongly alkaline, pH 9.4; abrupt smooth boundary.

Bw—1 inch to 8 inches (3 to 20 cm); red (2.5YR 5/6) clay loam, red (2.5YR 4/6), moist; 35 percent clay; moderate medium subangular blocky parting to weak very thin platy structure; very hard, very firm, moderately sticky and very plastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; violently effervescent; strongly alkaline, pH 8.8; abrupt wavy boundary.

Bk1—8 to 28 inches (20 to 71 cm); red (2.5YR 5/6) clay, red (2.5YR 4/6), moist; 40 percent clay; weak coarse angular blocky structure; very hard, very firm, moderately sticky and very plastic; common very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; gradual wavy boundary.

Bk2—28 to 48 inches (71 to 122 cm); red (2.5YR 5/6) clay loam, red (2.5YR 4/6), moist; 30 percent clay; weak coarse angular blocky structure; very hard, very firm, moderately sticky and very plastic; common very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; gradual wavy boundary.

2C—48 to 56 inches (122 to 142 cm); red (2.5YR 5/6) sandy loam, red (2.5YR 4/6), moist; 15 percent clay; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine; few very fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

2Bw—56 to 60 inches (142 to 152 cm); red (2.5YR 5/6) clay loam, red (2.5YR 4/6), moist; 35 percent clay; weak very coarse subangular blocky structure; moderately hard, friable, moderately sticky and very plastic; common very fine and fine roots throughout; few very fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

Massadona as used in this survey is a taxadjunct to the series because it has mixed mineralogy. Massadona series is a Fine, smectitic, mesic Typic Haplocambids.

Cn horizon

Hue: 2.5YR, 5YR

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, fine sand, loamy sand, loamy fine sand, loam, sandy clay loam, clay

Clay: 2 to 45 percent

Reaction: slightly alkaline to very strongly alkaline

Bw horizon

Hue: 2.5YR, 7.5YR

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sandy loam, fine sandy loam, sandy clay loam, clay loam, sandy clay

Clay: 15 to 40 percent

Reaction: moderately alkaline or strongly alkaline

Bk horizons

Hue: 2.5YR, 7.5YR

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: fine sandy loam, sandy clay loam, clay loam, clay

Clay: 15 to 40 percent

Reaction: moderately alkaline or strongly alkaline

Calcium carbonate equivalent: 0 to 4 percent

2C horizon

Hue: 2.5YR, 7.5YR

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, loamy sand, loamy fine sand, sandy loam

Clay: 3 to 18 percent

Reaction: moderately alkaline or strongly alkaline

2Bw horizon

Hue: 2.5YR, 7.5YR

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sandy clay loam, clay loam, sandy clay

Clay: 26 to 40 percent

Reaction: moderately alkaline or strongly alkaline

Cambic horizon—the zone from 1 to 28 inches (Bw and Bk1 horizons)

Monue soils

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Haplocambids

Geomorphic position: occurs on stream terraces on fan remnants

Parent material: eolian sands derived from sandstone

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 2 percent

bare soil: 63 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Available water capacity total inches: 6.3 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, broom snakeweed, galleta, longleaf Mormon tea, pricklypear and cholla, tansymustard

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 41' 30.60" north, 109° 51' 51.50" west

C1—0 to 2 inches (0 to 5 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 6 percent clay; single grain; loose, nonsticky and nonplastic; common very fine roots throughout; strongly effervescent; moderately alkaline, pH 8.2; gradual smooth boundary.

C2—2 to 7 inches (5 to 18 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 7 percent clay; weak very coarse angular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C3—7 to 15 inches (18 to 38 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few very fine, fine, and medium dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

Bk1—15 to 44 inches (38 to 112 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 13 percent clay; weak very coarse subangular blocky structure; moderately hard, friable, slightly sticky and nonplastic; few very fine and fine roots throughout; few very fine, fine, and medium dendritic tubular pores; few fine carbonate masses in matrix; 1 percent gravel; violently effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; gradual wavy boundary.

Bk2—44 to 62 inches (112 to 157 cm); yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6), moist; 18 percent clay; weak very coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; common very fine, fine, and medium dendritic tubular pores; few fine and medium carbonate masses in matrix; strongly effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizons

Hue: 2.5YR, 5YR

Value: 4 or 5, dry or moist

Chroma: 6 or 8, dry or moist

Texture: fine sand, loamy sand, loamy fine sand, sandy loam, loam

Clay: 3 to 20 percent

Reaction: slightly alkaline to strongly alkaline

Bk1 horizon

Hue: 2.5YR, 5YR

Value: 4 to 6, dry or moist

Chroma: 6 or 8, dry or moist

Texture: fine sand, loamy fine sand, sandy loam

Clay: 3 to 15 percent

Calcium carbonate equivalent: 0 to 4 percent

Reaction: moderately alkaline or strongly alkaline

Bk2 horizon

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 6 or 8, dry or moist

Texture: sandy loam, fine sandy loam, sandy clay loam, clay loam

Clay: 10 to 20 percent

Calcium carbonate equivalent: 0 to 4 percent

Reaction: moderately alkaline or strongly alkaline

Cambic horizon—the zone from 15 to 62 inches (Bk horizons)

52—Sheppard-Needle-Rock outcrop complex, 2 to 20 percent slopes

Map Unit Setting

Landform(s): dune fields

Elevation: 3,700 to 5,400 feet (1,128 to 1,645 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Sheppard and similar soils: 65 percent

Needle and similar soils: 15 percent

Rock outcrop: 15 percent

Minor Components: 5 percent

- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 2 to 20 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 20 percent

woody debris: 5 percent

bare soil: 85 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.3 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: Sand Dunes 6-10" p.z.

Ecological site number: R035XB260AZ

Present vegetation: Ephedra cutleri, blackbrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 49' 17.70" north, 111° 31' 58.70" west

C1—0 to 3 inches (0 to 8 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C2—3 to 13 inches (8 to 33 cm); yellowish red (5YR 5/8) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C3—13 to 62 inches (33 to 157 cm); reddish yellow (5YR 6/8) fine sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots throughout; few very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.4.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR
 Value: 4 to 7 dry, 3 to 6 moist
 Chroma: 4 to 8, dry or moist
 Texture: sand, fine sand
 Clay: 2 to 4 percent
 Reaction: slightly alkaline or moderately alkaline

Needle soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments

Geomorphic position: occurs on sand sheets in dune fields

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 2 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent
 woody debris: 10 percent
 bare soil: 70 percent
 rock fragments
 • gravel: 4 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.6 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Sandstone Upland 6-10" p.z. Calcareous

Ecological site number: R035XB230AZ

Present vegetation: Ephedra cutleri, blackbrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 49' 51.40" north, 111° 32' 25.50" west

C1—0 to 2 inches (0 to 5 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C2—2 to 9 inches (5 to 23 cm); yellowish red (5YR 5/6) sand, reddish brown (5YR 4/4), moist; 3 percent clay; single grain; soft, very friable, nonsticky and nonplastic;

few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.0; clear irregular boundary.

2R—9 inches (23 cm); violently effervescent; fractured, weathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 to 8, dry or moist

Texture: sand, coarse sand, fine sand

Clay: 2 to 4 percent

Reaction: slightly alkaline or moderately alkaline

Rock outcrop

Exposures of flat or rolling bedrock, typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

53—Sheppard-Sheppard, gypsic substratum complex, 2 to 11 percent slopes

Map Unit Setting

Landform(s): dune fields

Elevation: 4,800 to 5,100 feet (1,463 to 1,554 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Sheppard and similar soils: 50 percent

Sheppard, gypsic substratum and similar soils: 30 percent

Minor Components: 20 percent

- Typic Torriorthents
- Typic Haplocambids
- Gullied land

Soil Properties and Qualities

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian deposits derived from sandstone

Slope: 2 to 4 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 10 percent
 woody debris: 0 percent
 bare soil: 90 percent
 rock fragments: 0 percent
Drainage class: excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 3.7 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very low
Hydrologic group: A
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: fourwing saltbush
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 55' 15.50" north, 109° 56' 2.60" west

C1—0 to 4 inches (0 to 10 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; common very fine irregular pores; noneffervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—4 to 12 inches (10 to 30 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; common very fine irregular pores; noneffervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C3—12 to 28 inches (30 to 71 cm); red (2.5YR 4/8) loamy sand, red (2.5YR 4/6), moist; 9 percent clay; massive; soft, very friable, slightly sticky and nonplastic; common very fine roots throughout; 10 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C4—28 to 60 inches (71 to 152 cm); red (2.5YR 4/8) loamy sand, red (2.5YR 4/6), moist; 9 percent clay; massive; soft, very friable, slightly sticky and nonplastic; 2 percent gravel; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

C horizons

Hue: 5YR, 2.5YR

Value: 4 or 5, dry or moist

Chroma: 6 or 8, dry or moist

Texture: fine sand, loamy fine sand, loamy sand

Clay: 2 to 9 percent

Reaction: moderately alkaline or strongly alkaline

Some pedons have an A horizon.

Sheppard, gypsic substratum soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian deposits derived from sandstone over residuum weathered from rock gypsum

Slope: 2 to 11 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 10 percent

woody debris: 0 percent

bare soil: 90 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 40 to 60 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 3.0 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: fourwing saltbush, rabbitbrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 55' 38.40" north, 109° 56' 17.90" west

C1—0 to 8 inches (0 to 20 cm); red (2.5YR 4/8) loamy sand, red (2.5YR 4/8), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; common very fine irregular pores; noneffervescent; strongly alkaline, pH 8.6; clear smooth boundary.

C2—8 to 14 inches (20 to 36 cm); light reddish brown (2.5YR 6/4) loamy sand, red (2.5YR 4/8), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; 10 percent gravel; very slightly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C3—14 to 32 inches (36 to 81 cm); red (2.5YR 4/6) fine sand, red (2.5YR 4/8), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common medium carbonate masses in matrix; 2 percent gravel; slightly effervescent; moderately alkaline, pH 8.4; gradual smooth boundary.

C4—32 to 48 inches (81 to 122 cm); yellowish red (5YR 4/6) fine sand, reddish brown (5YR 5/4), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; very slightly effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

2Byb—48 to 50 inches (122 to 127 cm); pinkish white (5YR 8/2) loamy very fine sand, pinkish white (5YR 8/2), moist; 2 percent clay; weak fine subangular blocky structure; loose, nonsticky and nonplastic; common fine gypsum masses and common fine prominent salt masses in matrix; noneffervescent, 10 percent gypsum; moderately alkaline, pH 8.0; abrupt smooth boundary.

2R—50 inches (127 cm); fractured, unweathered sandstone and mudstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 2.5YR

Value: 4 to 6, dry or moist

Chroma: 4 to 8, dry or moist

Texture: sand, fine sand, loamy sand, loamy fine sand

Clay: 2 to 9 percent

Reaction: moderately alkaline or strongly alkaline

Byb horizon

Hue: 2.5YR, 5YR

Texture: loamy very fine sand, sandy loam

Clay: 2 to 28 percent

Reaction: moderately alkaline or strongly alkaline

Gypsum: 5 to 15 percent

Gypsic horizon—the zone from 48 to 50 inches (Byb horizon). This horizon is buried and not diagnostic.

Some pedons have an A horizon.

Some pedons have a thin Cr horizon.

Some pedons are very deep.

54—Sheppard-Typic Haplargids complex, 1 to 20 percent slopes

Map Unit Setting

Landform(s): dune fields, stream terraces

Elevation: 5,500 to 5,700 feet (1,676 to 1,737 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Sheppard and similar soils: 45 percent

Typic Haplargids and similar soils: 40 percent

Minor Components: 15 percent

- Lithic Torripsamments
- Gullied land

Soil Properties and Qualities

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets in dune fields

Parent material: eolian deposits derived from sandstone

Slope: 1 to 20 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 35 percent

 woody debris: 5 percent

 bare soil: 60 percent

 rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: yucca, broom snakeweed, longleaf Mormon tea, prickly Russian thistle, sand dropseed, spike dropseed

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 46' 45.90" north, 110° 14' 16.20" west

C1—0 to 1 inch (0 to 3 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; 2 percent gravel; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—1 inch to 8 inches (3 to 20 cm); reddish yellow (5YR 6/8) fine sand, yellowish red (5YR 5/6), moist; 2 percent clay; massive; loose, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; very slightly effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

C3—8 to 15 inches (20 to 38 cm); reddish yellow (5YR 6/8) fine sand, yellowish red (5YR 5/6), moist; 2 percent clay; massive; loose, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

C4—15 to 60 inches (38 to 152 cm); reddish yellow (5YR 6/8) sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 4 to 8, dry or moist

Chroma: 4 to 8, dry or moist

Texture: sand, fine sand, loamy sand, loamy fine sand

Clay: 2 to 8 percent

Reaction: moderately alkaline or strongly alkaline

Typic Haplargids soils

Taxonomic classification: Typic Haplargids

Geomorphic position: occurs on stream terraces

Parent material: alluvium derived from sandstone and/or eolian sands derived from sandstone

Slope: 1 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 2 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 5 percent

bare soil: 70 percent

rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)

Available water capacity total inches: 6.6 (moderate)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: occasional

Runoff class: negligible

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: prickly Russian thistle

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 47' 17.90" north, 110° 11' 43.00" west

C1—0 to 1 inch (0 to 3 cm); light brown (7.5YR 6/4) sandy clay loam, strong brown (7.5YR 5/6), moist; 34 percent clay; weak thick platy structure; soft, very friable, moderately sticky and very plastic; few very fine and fine roots throughout; 2 percent

fine gravel; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

2C2—1 inch to 18 inches (3 to 46 cm); yellowish red (5YR 5/8) fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

3Bt—18 to 31 inches (46 to 79 cm); light reddish brown (5YR 6/4) clay, reddish brown (5YR 4/4), moist; 45 percent clay; weak very coarse angular blocky structure; slightly hard, friable, moderately sticky and very plastic; few very fine roots throughout; few very fine dendritic tubular pores; very few faint clay films; violently effervescent; strongly alkaline, pH 8.6; clear smooth boundary.

3Bkn—31 to 44 inches (79 to 112 cm); light reddish brown (5YR 6/4) stratified loamy sand to sandy loam to sandy clay loam, yellowish red (5YR 5/6), moist; 8 percent clay; weak very coarse angular blocky structure; moderately hard, friable, nonsticky and nonplastic; few very fine roots throughout; many very fine dendritic tubular pores; common fine carbonate masses in matrix; strongly effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.8; clear smooth boundary.

3Cn1—44 to 56 inches (112 to 142 cm); yellowish red (5YR 5/6) stratified sandy loam to sandy clay loam, yellowish red (5YR 4/6), moist; 25 percent clay; massive; very hard, very firm, nonsticky and nonplastic; few very fine roots throughout; common very fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.8; clear smooth boundary.

3Cn2—56 to 60 inches (142 to 152 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; hard, firm, nonsticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.8.

Range in Characteristics

Typic Haplargids have soil properties that vary outside of family class limits.

C1 horizon

Hue: 5YR, 7.5YR

Value: 5 or 6, dry or moist

Chroma: 4 to 6, dry or moist

Texture: sandy clay loam, sandy clay

Clay: 30 to 40 percent

Reaction: moderately alkaline or strongly alkaline

2C2 horizon

Hue: 5YR, 7.5YR

Value: 5 or 6 dry, 4 to 6 moist

Chroma: 6 or 8, dry or moist

Texture: sand, fine sand, loamy sand

Clay: 3 to 10 percent

Reaction: moderately alkaline or strongly alkaline

3Bt horizon

Hue: 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 4 to 8 dry, 4 or 6 moist

Texture: sandy clay loam, sandy clay, clay
 Clay: 35 to 50 percent
 Reaction: moderately alkaline or strongly alkaline

3Bkn horizon

Hue: 5YR or 7.5YR
 Value: 5 or 6, dry or moist
 Chroma: 4 or 6, dry or moist
 Texture: stratified loamy sand, sandy loam, sandy clay loam
 Clay: 3 to 12
 Reaction: moderately alkaline or strongly alkaline
 Calcium carbonate equivalent: 0 to 4 percent

3Cn horizons

Hue: 5YR, 7.5YR
 Value: 4 to 6, dry or moist
 Chroma: 4 or 6, dry or moist
 Texture: loamy sand, sandy loam, sandy clay loam
 Clay: 6 to 35 percent
 Reaction: moderately alkaline or strongly alkaline

Argillic horizon—the zone from 18 to 31 inches (3Bt horizon)

55—Shoegame family, 1 to 5 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 5,860 to 5,940 feet (1,786 to 1,812 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush-Grassland

Map Unit Composition

Shoegame family and similar soils: 90 percent

Minor Components: 10 percent

- Torripsamments and similar soils
- Torriorthents and similar soils

Soil Properties and Qualities

Shoegame family soils

Taxonomic classification: Sandy-skeletal, mixed, mesic Ustic Haplocalcids

Geomorphic position: occurs on mesa summits

Parent material: sandy eolian sands derived from sandstone over Carmel Formation
 gravelly residuum weathered from sedimentary rock

Slope: 1 to 5 percent

Surface cover:

Biological crust
 cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent
 Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 20 percent

woody debris: 5 percent

bare soil: 70 percent

rock fragments

- gravel: 10 percent

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 7.9 (high)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Upland 10-14" p.z. Limy, Gravelly

Ecological site number: R035XC345AZ

Present vegetation: galleta, Indian ricegrass, narrowleaf yucca, Cutler Mormon tea, Utah juniper

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 14' 23.60" north, 111° 0' 54.10" west

C1—0 to 3 inches (0 to 8 cm); yellowish red (5YR 5/6) sand, reddish brown (5YR 4/4), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; 10 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; gradual smooth boundary.

C2—3 to 16 inches (8 to 41 cm); yellowish red (5YR 5/6) gravelly sand, reddish brown (5YR 4/4), moist; 4 percent clay; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few coarse roots throughout; common very fine and fine tubular pores; 15 percent gravel; strongly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

Bk—16 to 38 inches (41 to 97 cm); pink (5YR 7/4) very gravelly sand, light reddish brown (5YR 6/4), moist; 7 percent clay; weak medium subangular blocky structure; hard, friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine vesicular pores; discontinuous faint silica and carbonate coats on rock fragments; common medium carbonate nodules in matrix; 30 percent gravel and 10 percent cobble; violently effervescent, 16 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; gradual wavy boundary.

Bkq1—38 to 52 inches (97 to 132 cm); pinkish gray (5YR 7/2) very gravelly sand, pinkish gray (5YR 6/2), moist; 4 percent clay; weak medium subangular blocky structure; hard, friable, nonsticky and nonplastic; few very fine and fine roots around fragments; common very fine and fine vesicular pores; discontinuous faint carbonate coats and silica on rock fragments; common medium carbonate nodules in matrix; 40 percent gravel and 10 percent cobble; violently effervescent, 9 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; gradual wavy boundary.

Bkq2—52 to 60 inches (132 to 152 cm); pinkish gray (5YR 7/2) very gravelly loamy sand, pinkish gray (5YR 6/2), moist; 7 percent clay; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots around fragments; common very fine and fine irregular pores; discontinuous faint

carbonate coats and silica on rock fragments; common medium carbonate nodules in matrix; 25 percent gravel and 10 percent cobble; violently effervescent, 6 percent calcium carbonate equivalent; moderately alkaline, pH 8.2.

Range in Characteristics

Shoegame family differs from the series because the series has a calcic horizon at 3 to 10 inches and hues of 10YR and 7.5YR.

C horizons

Value: 5 or 6 dry, 4 or 5 moist
 Chroma: 4 or 6, dry or moist
 Texture: sand, loamy sand
 Reaction: moderately alkaline or strongly alkaline.
 Rock fragments: 5 to 15 percent gravel
 Calcium carbonate equivalent: 2 to 4 percent

Bk horizon

Value: 6 or 7 dry, 5 or 6 moist
 Chroma: 3 or 4, dry or moist
 Reaction: moderately alkaline or strongly alkaline.
 Rock fragments: 20 to 30 percent gravel and 5 to 10 percent cobbles
 Calcium carbonate equivalent: 10 to 25 percent

Bkq horizons

Value: 6 or 7 dry, 5 or 6 moist
 Texture: loamy sand, sand
 Reaction: moderately alkaline or strongly alkaline.
 Rock fragments: 35 to 40 percent gravel and 5 to 10 percent cobbles
 Calcium carbonate equivalent: 10 to 25 percent

Calcic horizon—the zone from 16 to 60 inches (Bk and Bqk horizons)

Some pedons have calcium carbonate pendants and thick coatings on gravel. Some pedons have slightly hard to hard silica cementation of sand grains and gravel.

56—Torriorthents-Rock outcrop complex, 25 to 65 percent slopes

Map Unit Setting

Landform(s): escarpments

Elevation: 3,080 to 7,200 feet (939 to 2,195 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Torriorthents and similar soils: 55 percent

Rock outcrop: 30 percent

Minor Components: 15 percent

- Soils on slopes greater than 65 percent
- Cliffs
- The Paria River, a perennial stream

- Lithic and Typic Torripsamments on foot and toe slopes
- Gullied land

Soil Properties and Qualities

Torriorthents soils

Taxonomic classification: Torriorthents

Geomorphic position: occurs on fan remnants and ledges on escarpments

Parent material: gypsiferous colluvium and/or alluvium derived from sedimentary rock

Slope: 25 to 65 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 5 percent

woody debris: 5 percent

bare soil: 90 percent

rock fragments

- gravel: 60 percent

- cobble: 15 percent

- stone: 10 percent

Depth to restrictive feature(s): 4 to 40 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.6 (very low)

Shrink-swell potential: about 3.0 LEP (moderate)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Sedimentary Cliffs 10-14" p.z.

Ecological site number: R035XC302AZ

Present vegetation: *Hesperostipa comata* ssp. *comata*, Indian ricegrass, Utah juniper, big sagebrush, blue grama, *Ephedra*, *Pleuraphis jamesii*, muttongrass

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 55' 35.10" north, 111° 19' 30.00" west

A—0 to 2 inches (0 to 5 cm); reddish brown (5YR 5/4) very channery fine sandy loam, reddish brown (5YR 4/4), moist; 18 percent clay; weak medium granular and weak fine granular structure; soft, friable, nonsticky and slightly plastic; few medium and coarse roots throughout; few very fine vesicular pores; 50 percent channer; violently effervescent; moderately alkaline, pH 8.2; gradual smooth boundary.

Bw—2 to 8 inches (5 to 20 cm); yellowish red (5YR 5/6) extremely channery sandy clay loam, yellowish red (5YR 4/6), moist; 22 percent clay; weak medium subangular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; few

medium roots throughout; few very fine dendritic tubular pores; 60 percent channer; violently effervescent; strongly alkaline, pH 8.8; clear smooth boundary.

R—8 inches (20 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

Torriorthents have soil properties that vary outside of family class limits.

A horizon

Chroma: 4 or 6, dry or moist

Clay: 16 to 20 percent

Rock fragments: 45 to 65 percent

Bw horizon

Chroma: 4 or 6, dry or moist

Texture: sandy loam, loamy sand, sandy clay loam

Clay: 8 to 22 percent

Reaction: moderately alkaline or strongly alkaline

Rock fragments: 55 to 65 percent

Rock outcrop

Exposures of steep bedrock and cliffs, which are typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

57—Tsaya family-Sheppard, moderately deep-Rock outcrop complex, 2 to 19 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 5,000 to 5,200 feet (1,524 to 1,585 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Tsaya family and similar soils: 40 percent

Sheppard, moderately deep and similar soils: 30 percent

Rock outcrop: 20 percent

Minor Components: 10 percent

- Typic Haplocalcids
- Active dunes and sand sheets

Soil Properties and Qualities

Tsaya family soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic

Lithic Torriorthents

Geomorphic position: occurs on escarpments and ledges on mesas

Parent material: colluvium derived from sandstone and/or eolian deposits derived from sandstone

Slope: 2 to 19 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 5 percent

 woody debris: 2 percent

 bare soil: 93 percent

 rock fragments

- gravel: 60 percent

Depth to restrictive feature(s): 4 to 10 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.3 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: yucca, broom snakeweed

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 49' 48.20" north, 109° 53' 45.20" west

A—0 to 1 inch (0 to 3 cm); reddish brown (5YR 5/4) extremely gravelly loamy fine sand, yellowish red (5YR 5/6), moist; 6 percent clay; weak fine platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots throughout; 60 percent gravel; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C—1 inch to 6 inches (3 to 15 cm); yellowish red (5YR 5/8) extremely gravelly sandy loam, yellowish red (5YR 4/6), moist; 15 percent clay; massive; loose, nonsticky and nonplastic; few very fine roots throughout; 70 percent gravel; strongly effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

R—6 inches (15 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

Tsaya family differs from the series because the series has 18 to 35 percent clay in the particle size control section.

A horizon

 Chroma: 4 or 6, dry or moist

 Texture: loamy fine sand, sand

 Clay: 4 to 8 percent

 Reaction: moderately alkaline or strongly alkaline

C horizon

Texture: loamy fine sand, sand

Clay: 4 to 15 percent

Reaction: moderately alkaline or strongly alkaline

Some pedons have a thin Cr horizon.

Sheppard, moderately deep soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on sand sheets on mesa summits

Parent material: eolian deposits derived from sandstone

Slope: 2 to 6 percent

Surface cover:**Biological crust**

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 19 percent

woody debris: 1 percent

bare soil: 80 percent

rock fragments

- gravel: 5 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic; 20 to 40 inches to bedrock, paralithic

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.4 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: yucca, broom snakeweed

Land capability (non irrigated): 7c

Typical Profile**Location**

Geographic Coordinate System:

36° 50' 7.80" north, 109° 53' 56.00" west

C1—0 to 4 inches (0 to 10 cm); strong brown (7.5YR 5/8) sand, strong brown (7.5YR 4/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine roots throughout; 5 percent gravel; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C2—4 to 16 inches (10 to 41 cm); yellowish red (5YR 5/8) sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; common fine carbonate masses in

matrix; 7 percent gravel; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C3—16 to 20 inches (41 to 51 cm); yellowish red (5YR 5/8) gravelly loamy fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; common fine carbonate masses in matrix; 15 percent gravel; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C4—20 to 28 inches (51 to 71 cm); yellowish red (5YR 5/8) gravelly loamy fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; common fine carbonate masses in matrix; 15 percent gravel; violently effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

Cr—28 to 32 inches (71 to 81 cm); fractured, weathered sandstone bedrock.

R—32 inches (81 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Texture: sand, loamy sand, loamy fine sand

Clay: 3 to 12 percent

Reaction: moderately alkaline or strongly alkaline

Some pedons do not have a Cr horizon.

Rock outcrop

Exposures of steep bedrock and cliffs, which are typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material

58—Typic Haplocambids-Sheppard-Needle complex, 0 to 10 percent slopes

Map Unit Setting

Landform(s): dune fields, structural benches

Elevation: 5,100 to 5,400 feet (1,554 to 1,646 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Typic Haplocambids and similar soils: 35 percent

Sheppard and similar soils: 30 percent

Needle and similar soils: 25 percent

Minor Components: 10 percent

- Active dunes and sand sheets
- Rock outcrop
- Gullied land

Soil Properties and Qualities

Typic Haplocambids soils

Taxonomic classification: Typic Haplocambids

Geomorphic position: occurs on structural benches

Parent material: eolian sands derived from sandstone over residuum weathered from mudstone

Slope: 1 to 5 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 3 percent

 woody debris: 0 percent

 bare soil: 97 percent

 rock fragments: 0 percent

Depth to restrictive feature(s): 10 to 40 inches to bedrock, densic; 20 to 40 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 4.5 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: broom snakeweed, shadscale saltbush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 54' 14.75" north, 109° 47' 7.21" west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) sandy clay loam, reddish brown (5YR 4/4), moist; 20 percent clay; weak fine platy structure; soft, very friable, slightly sticky and moderately plastic; few very fine roots throughout; slightly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Bw—1 inch to 10 inches (3 to 25 cm); red (2.5YR 4/6) sandy clay loam, red (2.5YR 4/6), moist; 32 percent clay; weak fine subangular blocky structure; soft, very friable, slightly sticky and moderately plastic; few very fine and fine roots throughout; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C—10 to 26 inches (25 to 66 cm); reddish brown (2.5YR 5/4) clay, dark red (2.5YR 3/6), moist; 45 percent clay; strong fine platy structure; extremely hard, very friable, moderately sticky and moderately plastic; few very fine roots throughout; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Cd—26 to 29 inches (66 to 74 cm); reddish brown (2.5YR 4/4) clay, dark red (2.5YR 3/6), moist; 45 percent clay; moderate coarse angular blocky structure; extremely hard, very friable, moderately sticky and moderately plastic; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

R—29 inches (74 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

Typic Haplocambids have soil properties that vary outside of family class limits.

A horizon

Hue: 2.5YR, 5YR
Chroma: 4 or 6, dry or moist
Texture: sandy loam, sandy clay loam
Clay: 18 to 35 percent
Reaction: moderately alkaline or strongly alkaline

Bw horizon

Hue: 2.5YR, 5YR
Value: 4 or 5 dry, 4 or 5 moist
Texture: sandy clay, clay, sandy clay loam
Clay: 30 to 60 percent
Reaction: moderately alkaline or strongly alkaline

C horizon

Hue: 2.5YR, 5YR
Value: 4 or 5 dry, 3 to 6 moist
Chroma: 4 or 6, dry or moist
Texture: clay, sandy clay
Clay: 40 to 60 percent
Reaction: moderately alkaline or strongly alkaline

Cd horizon

Hue: 2.5YR, 5YR
Value: 4 or 5 dry, 3 to 6 moist
Chroma: 4 or 6, dry or moist
Clay: 40 to 60 percent
Reaction: moderately alkaline or strongly alkaline

Cambic horizon—the zone from 1 to 10 inches (Bw horizon)

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on stabilized dunes in dune fields

Parent material: eolian sands derived from sandstone

Slope: 0 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 5 percent

woody debris: 0 percent

bare soil: 95 percent
 rock fragments: 0 percent
Drainage class: excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Available water capacity total inches: 5.9 (moderate)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very low
Hydrologic group: A
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: Ephedra, yucca
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 53' 58.40" north, 109° 50' 46.50" west

C1—0 to 2 inches (0 to 5 cm); yellowish red (5YR 5/8) loamy sand, reddish brown (5YR 5/4), moist; 1 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—2 to 8 inches (5 to 20 cm); yellowish red (5YR 5/6) loamy fine sand, reddish brown (5YR 5/4), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; slightly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C3—8 to 32 inches (20 to 81 cm); yellowish red (5YR 5/6) loamy fine sand, reddish brown (5YR 4/4), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; gradual smooth boundary.

C4—32 to 60 inches (81 to 152 cm); yellowish red (5YR 5/8) loamy fine sand, reddish brown (5YR 4/4), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots throughout; noneffervescent; moderately alkaline, pH 8.0.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR

Value: 5 to 7 dry, 4 to 6 moist

Chroma: 3 to 8, dry or moist

Texture: sand, fine sand, very fine sand, loamy sand, loamy fine sand, loamy very fine sand

Clay: 2 to 8 percent

Reaction: slightly alkaline to strongly alkaline

Needle soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments

Geomorphic position: occurs on sand sheets in dune fields

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone

Slope: 1 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 10 percent

woody debris: 0 percent

bare soil: 90 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 5.95 to 19.98 inches per hour (42.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 1.2 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: yucca, blackbrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 53' 40.76" north, 109° 51' 30.11" west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/8) loamy fine sand, yellowish red (5YR 5/6), moist; 4 percent clay; weak medium platy structure; loose, nonsticky and nonplastic; few fine and medium roots throughout; few very fine irregular pores; very slightly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C—1 inch to 12 inches (3 to 30 cm); yellowish red (5YR 4/6) loamy fine sand, yellowish red (5YR 4/6), moist; 7 percent clay; massive; loose, nonsticky and nonplastic; few fine and medium roots throughout; few very fine irregular pores; very slightly effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—12 inches (30 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

A horizon

Value: 5 or 6 dry, 4 or 5 moist

Chroma: 4 to 8, dry or moist

Texture: loamy fine sand, loamy very fine sand

Clay: 1 to 4 percent

Reaction: neutral to moderately alkaline

C horizon

Value: 4 or 5 dry, 4 to 6 moist
 Chroma: 4 to 8, dry or moist
 Texture: loamy fine sand, loamy very fine sand
 Clay: 5 to 10 percent
 Reaction: neutral to moderately alkaline

59—Typic Torriorthents, 1 to 5 percent slopes**Map Unit Setting**

Landform(s): mesas
Elevation: 4,400 to 4,600 feet (1,341 to 1,402 meters)
Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Typic Torriorthents and similar soils: 95 percent
 Minor Components: 5 percent

- Rock outcrop
- Active dunes and sand sheets

Soil Properties and Qualities**Typic Torriorthents soils**

Taxonomic classification: Typic Torriorthents
Geomorphic position: occurs on mesa summits
Parent material: eolian sands derived from sandstone over residuum weathered from mudstone
Slope: 1 to 5 percent
Surface cover:

- Biological crust
 - cyanobacteria: 0 percent
 - lichen: 0 percent
 - moss: 0 percent
- Chemical crust
 - salt: 0 percent
 - gypsum: 0 percent
- Surface crust
 - weak thin platy structure
- Physical cover
 - canopy plant cover: 40 percent
 - woody debris: 5 percent
 - bare soil: 65 percent
 - rock fragments
 - gravel: 3 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, densic; 10 to 60 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.8 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: negligible

Hydrologic group: D

Ecological site name: Shallow Sandy Loam 6-10" p.z. Calcareous

Ecological site number: R035XB234AZ

Present vegetation: Ephedra cutleri, blackbrush, fourwing saltbush, sixweeks fescue

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 52' 25.90" north, 111° 28' 30.30" west

C1—0 to 2 inches (0 to 5 cm); red (2.5YR 4/6) loamy coarse sand, dark red (2.5YR 3/6), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; strongly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

C2—2 to 6 inches (5 to 15 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C3—6 to 10 inches (15 to 25 cm); red (2.5YR 4/6) sandy loam, dark red (2.5YR 3/6), moist; 12 percent clay; massive; soft, very friable, very sticky and slightly plastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Cd—10 to 26 inches (25 to 66 cm); red (2.5YR 5/6) sandy loam, red (2.5YR 4/6), moist; 9 percent clay; massive; moderately hard, friable, very sticky and slightly plastic; few very fine, fine, medium, and coarse roots in cracks; 5 percent gravel; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

R—26 inches (66 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

Typic Torriorthents have soil properties that vary outside of family class limits.

C1 and C2 horizons

Hue: 2.5YR, 5YR

Value: 4 or 5 dry, 3 or 4 moist

Chroma: 4 or 6, dry or moist

Texture: loamy coarse sand, sand, loamy sand

Clay: 2 to 10 percent

Reaction: slightly alkaline to strongly alkaline

C3 horizon

Hue: 2.5YR, 5YR

Value: 3 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sand, loamy sand, sandy loam

Clay: 5 to 15 percent

Reaction: slightly alkaline to strongly alkaline

Cd horizon

Hue: 2.5YR, 5YR

Value: 4 or 5, dry or moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, sandy loam

Clay: 2 to 10 percent

Reaction: slightly alkaline to strongly alkaline

60—Typic Torriorthents-Needle-Moenkopie family complex, 2 to 12 percent slopes**Map Unit Setting***Landform(s):* structural benches*Elevation:* 4,700 to 5,400 feet (1,433 to 1,646 meters)*Mean annual precipitation:* 6 to 10 inches (152 to 254 millimeters)*Mean annual air temperature:* 54 to 57 degrees F (12.0 to 14.0 degrees C)*Mean annual soil temperature:* 56 to 59 degrees F (13.1 to 15.1 degrees C)*Frost-free period:* 150 to 180 days*Major Land Resource Area:* 35; Colorado Plateau*Land Resource Unit:* 35-2AZ Colorado Plateau Cold Desert Shrub**Map Unit Composition**

Typic Torriorthents and similar soils: 35 percent

Needle and similar soils: 30 percent

Moenkopie family and similar soils: 25 percent

Minor Components: 10 percent

- Rock outcrop
- Active dunes and sand sheets
- Gullied land

Soil Properties and Qualities**Typic Torriorthents soils***Taxonomic classification:* Typic Torriorthents*Geomorphic position:* occurs on terraces and benches*Parent material:* eolian sands derived from sandstone over residuum weathered from sandstone and siltstone*Slope:* 2 to 8 percent*Surface cover:*

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 2 percent

bare soil: 73 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 20 to 50 inches to bedrock, lithic*Drainage class:* well drained

Ksat solum: 0.00 to 5.95 inches per hour (0.01 to 42.00 micrometers per second)
Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 4.3 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, blackbrush, fourwing saltbush, rabbitbrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 48' 8.10" north, 111° 16' 10.60" west

C1—0 to 2 inches (0 to 5 cm); yellowish red (5YR 5/8) fine sand, yellowish red (5YR 4/6), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—2 to 25 inches (5 to 64 cm); yellowish red (5YR 5/8) fine sand, yellowish red (5YR 4/6), moist; 2 percent clay; massive; loose, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; few very fine dendritic tubular pores; noneffervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

2Cn—25 to 42 inches (64 to 107 cm); red (2.5YR 4/6) clay, dark red (2.5YR 3/6), moist; 50 percent clay; massive; hard, friable, moderately sticky and very plastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; common fine, medium, and coarse carbonate masses in matrix; 1 percent gravel; violently effervescent; strongly alkaline, pH 8.8; gradual wavy boundary.

2R—42 inches (107 cm); fractured, weathered sandstone and mudstone bedrock.

Range in Characteristics

Lithic Torriorthents have soil properties that vary outside of family class limits.

C horizons

Hue: 2.5YR, 5YR, 7.5YR

Value: 4 to 6 dry, 4 or 5 moist

Chroma: 6 or 8 dry, 4 or 6 moist

Texture: sand, fine sand, loamy sand, loamy fine sand

Clay: 2 to 8 percent

Reaction: moderately alkaline or strongly alkaline

2Cn horizon

Hue: 2.5YR, 5YR, 7.5YR

Value: 4 or 5 dry, 3 or 4 moist

Chroma: 4 or 6, dry or moist

Texture: sandy clay loam, clay loam, clay

Clay: 20 to 50 percent

Reaction: moderately alkaline or strongly alkaline

Needle soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments

Geomorphic position: occurs on sand sheets on structural benches

Parent material: eolian sands derived from sandstone and siltstone

Slope: 2 to 3 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 35 percent

 woody debris: 1 percent

 bare soil: 64 percent

 rock fragments

- gravel: 2 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 0.6 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: blackbrush, cheatgrass, fourwing saltbush, longleaf Mormon tea

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 47' 53.80" north, 111° 15' 14.90" west

C1—0 to 3 inches (0 to 8 cm); yellowish red (5YR 5/8) loamy sand, yellowish red (5YR 4/6), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—3 to 10 inches (8 to 25 cm); red (2.5YR 4/6) loamy sand, dark red (2.5YR 3/6), moist; 6 percent clay; massive; soft, loose, slightly sticky and nonplastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; 1 percent gravel; violently effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

R—10 inches (25 cm); fractured, unweathered sandstone and mudstone bedrock.

Range in Characteristics

C horizons

Hue: 2.5YR, 5YR, 7.5YR

Value: 4 to 6 dry, 3 or 4 moist

Chroma: 4 to 8 dry, 4 or 6 moist

Texture: sand, fine sand, loamy sand

Clay: 2 to 13 percent

Reaction: moderately alkaline or strongly alkaline

Moenkopie family soils

Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Torriorthents

Geomorphic position: occurs on erosional remnants on structural benches

Parent material: residuum weathered from sandstone and siltstone

Slope: 2 to 12 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 15 percent

woody debris: 1 percent

bare soil: 84 percent

rock fragments

- gravel: 2 percent

- cobble: 1 percent

- stone: 1 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, paralithic; 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 2.0 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very low

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, blackbrush, cheatgrass, fourwing saltbush, galleta, longleaf Mormon tea, rabbitbrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 48' 17.60" north, 111° 16' 44.60" west

C1—0 to 3 inches (0 to 8 cm); yellowish red (5YR 4/6) clay loam, dark reddish brown (5YR 3/4), moist; 30 percent clay; moderate fine granular structure; soft, very friable, moderately sticky and very plastic; few very fine roots throughout; 1 percent gravel; violently effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—3 to 12 inches (8 to 30 cm); reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4), moist; 26 percent clay; massive; very hard, very friable, slightly sticky and moderately plastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few medium carbonate nodules and common coarse carbonate

masses in matrix; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Cr—12 to 13 inches (30 to 33 cm); fractured, weathered sandstone and mudstone bedrock.

R—13 inches (33 cm); fractured, unweathered sandstone and mudstone bedrock.

Range in Characteristics

C horizons

Hue: 2.5YR, 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: loamy sand, sandy loam, fine sandy loam, sandy clay loam, clay loam

Clay: 4 to 30 percent

Reaction: moderately alkaline or strongly alkaline

61—Urban land-Gotho-Tewa complex, 1 to 5 percent slopes

Map Unit Setting

Landform(s): stream terraces

Elevation: 5,300 to 6,000 feet (1,616 to 1,829 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Urban land: 55 percent

Gotho and similar soils: 20 percent

Tewa and similar soils: 15 percent

Minor Components: 10 percent

- Monue and similar soils
- Rehobeth and similar soils

Soil Properties and Qualities

Urban land

Land mostly covered by streets, parking lots, buildings, and other structures of urban areas.

Gotho soils

Taxonomic classification: Fine-loamy, mixed, superactive, calcareous, mesic Typic Torriorthents

Geomorphic position: occurs on stream terraces

Parent material: alluvium derived from mixed

Slope: 1 to 5 percent

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 10 percent
woody debris: 5 percent
bare soil: 85 percent
rock fragments: 0 percent
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Available water capacity total inches: 9.1 (high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: low
Hydrologic group: C
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: fourwing saltbush, globemallow, prickly Russian thistle
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:
36° 43' 7.60" north, 110° 14' 30.20" west

A1—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) sandy loam, brown (10YR 4/3), moist; 10 percent clay; moderate thick platy structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine and common fine, medium, and coarse roots throughout; few very fine and fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

A2—2 to 5 inches (5 to 13 cm); brown (10YR 5/3) sandy loam, brown (10YR 4/3), moist; 12 percent clay; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common fine, medium, and coarse roots throughout; common very fine and fine, and few medium and coarse dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

C1—5 to 13 inches (13 to 33 cm); light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4), moist; 12 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots throughout; few very fine and common fine dendritic tubular pores; common fine carbonate masses and common medium silica masses in matrix; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C2—13 to 26 inches (33 to 66 cm); light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4), moist; 18 percent clay; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots throughout; few very fine dendritic tubular pores; few medium carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C3—26 to 33 inches (66 to 84 cm); yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4), moist; 25 percent clay; massive; hard, very friable, slightly sticky and moderately plastic; few very fine roots throughout; few very fine dendritic tubular pores; common fine and medium carbonate masses in matrix; violently effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

C4—33 to 52 inches (84 to 132 cm); brown (10YR 5/3) clay loam, dark yellowish brown (10YR 4/4), moist; 35 percent clay; massive; very hard, very friable, nonsticky and moderately plastic; few very fine roots throughout; few very fine dendritic tubular pores; common fine and medium carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C5—52 to 60 inches (132 to 152 cm); pale brown (10YR 6/3) sandy clay loam, dark yellowish brown (10YR 4/4), moist; 30 percent clay; massive; extremely hard, very friable, slightly sticky and very plastic; few very fine roots throughout; few very fine dendritic tubular pores; common fine and medium carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

A horizons

Hue: 7.5YR, 10YR
 Value: 5 or 6 dry, 3 to 6 moist
 Chroma: 3 to 6, dry or moist
 Texture: sandy loam, fine sandy loam
 Clay: 5 to 18 percent
 Reaction: moderately alkaline or strongly alkaline

C horizons

Hue: 7.5YR, 10YR, 2.5Y
 Value: 5 or 6 dry, 2 to 4 moist
 Chroma: 3 or 4, dry or moist
 Texture: sandy loam, sandy clay loam, clay loam
 Clay: 10 to 40 percent
 Reaction: moderately alkaline or strongly alkaline

Tewa soils

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Haplocambids

Geomorphic position: occurs on stream terraces

Parent material: alluvium derived from mixed

Slope: 1 to 5 percent

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 5 percent
 woody debris: 10 percent
 bare soil: 85 percent
 rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Available water capacity total inches: 10.2 (very high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: common sunflower, fourwing saltbush, globemallow, prickly Russian thistle

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 42' 53.20" north, 110° 15' 14.40" west

A—0 to 1 inch (0 to 3 cm); light olive brown (2.5Y 5/3) clay loam, olive brown (2.5Y 4/3), moist; 35 percent clay; strong thick platy and moderate fine granular structure; soft, very friable, moderately sticky and moderately plastic; few very fine and fine roots throughout; few very fine vesicular and dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bw—1 inch to 14 inches (3 to 36 cm); brown (10YR 5/3) clay, brown (10YR 4/3), moist; 45 percent clay; moderate very thick platy parting to weak coarse subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots throughout; few very fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C1—14 to 21 inches (36 to 53 cm); grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2), moist; 35 percent clay; massive; moderately hard, very friable, moderately sticky and moderately plastic; few very fine roots throughout; few very fine dendritic tubular pores; few medium carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.2; abrupt broken boundary.

C2—21 to 28 inches (53 to 71 cm); yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4), moist; 20 percent clay; massive; slightly hard, very friable, slightly sticky and moderately plastic; few very fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C3—28 to 37 inches (71 to 94 cm); dark grayish brown (2.5Y 4/2) clay loam, (2.5Y 2/2), moist; 35 percent clay; massive; moderately hard, very friable, slightly sticky and moderately plastic; many very fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C4—37 to 43 inches (94 to 109 cm); dark grayish brown (2.5Y 4/2) stratified clay to sandy loam, very dark grayish brown (2.5Y 3/2), moist; 40 percent clay; massive; very hard, very friable, moderately sticky and moderately plastic; few very fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; slightly alkaline, pH 7.6; clear smooth boundary.

C5—43 to 49 inches (109 to 124 cm); brown (10YR 5/3) clay loam, brown (10YR 4/3), moist; 30 percent clay; massive; moderately hard, very friable, slightly sticky and moderately plastic; few very fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; slightly alkaline, pH 7.8; gradual smooth boundary.

C6—49 to 60 inches (124 to 152 cm); brown (10YR 5/3) sandy clay loam, brown (10YR 4/3), moist; 30 percent clay; massive; moderately hard, very friable, moderately sticky and moderately plastic; few very fine roots throughout; few very fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

A horizon

Hue: 2.5Y, 10YR
 Value: 5 or 6 dry, 3 to 6 moist
 Chroma: 3 to 6, dry or moist
 Reaction: slightly alkaline to strongly alkaline

Bw horizon

Hue: 10YR, 2.5Y
 Value: 5 or 6 dry, 2 to 4 moist
 Chroma: 2 to 4, dry or moist
 Texture: clay, clay loam
 Clay: 35 to 50 percent
 Reaction: slightly alkaline to strongly alkaline

C horizons

Hue: 10YR, 2.5Y
 Value: 4 to 6 dry, 2 to 4 moist
 Chroma: 2 to 4, dry or moist
 Texture: sandy loam, loam, sandy clay loam, clay loam, clay
 Clay: 15 to 45 percent
 Reaction: slightly alkaline to strongly alkaline

Cambic horizon—the zone from 1 to 14 inches (Bw horizon)

62—Urban land-Nakai complex, 1 to 15 percent slopes

Map Unit Setting

Landform(s): structural benches

Elevation: 5,570 to 5,790 feet (1,698 to 1,765 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Urban land: 80 percent

Nakai and similar soils: 10 percent

Minor Components: 10 percent

- Typic Haplocambids
- Nakai soils on steeper slopes
- Rock outcrop
- Active dunes and sand sheets

Soil Properties and Qualities

Urban land

Land mostly covered by streets, parking lots, buildings, and other structures of urban areas.

Nakai soils

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Haplocalcids

Geomorphic position: occurs on sand sheets on structural benches

Parent material: alluvium derived from sandstone over residuum weathered from calcareous sandstone

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 10 percent

woody debris: 10 percent

bare soil: 80 percent

rock fragments: 0 percent

Depth to restrictive feature(s): 40 to 60 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 3.8 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Indian ricegrass, broom snakeweed, buckwheat, globemallow, prickly Russian thistle

Land capability (non irrigated): 7c

Typical Profile**Location**

Geographic Coordinate System:

36° 43' 23.10" north, 110° 16' 16.30" west

C1—0 to 1 inch (0 to 3 cm); strong brown (7.5YR 5/6) loamy sand, strong brown (7.5YR 4/6), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots throughout; few very fine and fine tubular pores; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C2—1 inch to 10 inches (3 to 25 cm); strong brown (7.5YR 5/6) loamy sand, strong brown (7.5YR 4/6), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium roots throughout; few very fine and fine tubular pores; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C3—10 to 17 inches (25 to 43 cm); brown (7.5YR 5/4) loamy sand, brown (7.5YR 4/4), moist; 12 percent clay; weak medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and few fine and medium roots throughout; few very fine and fine tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

C4—17 to 24 inches (43 to 61 cm); brown (7.5YR 5/4) loamy sand, strong brown (7.5YR 4/6), moist; 12 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine and medium roots throughout; few very fine, fine, and medium tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

C5—24 to 32 inches (61 to 81 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 13 percent clay; weak medium angular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine and fine roots throughout; common very fine tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk—32 to 44 inches (81 to 112 cm); pink (5YR 7/3) parachannery fine sandy loam, yellowish red (5YR 4/6), moist; 14 percent clay; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots throughout; few very fine tubular pores; common fine carbonate masses on surfaces along root channels and in matrix; 15 percent channer; violently effervescent, 10 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—44 inches (112 cm); fractured, unweathered sandstone bedrock.

Range in Characteristics

C horizons

Hue: 5YR, 7.5YR
 Value: 4 to 6 dry, 4 or 5 moist
 Chroma: 4 or 6, dry or moist
 Textures: loamy sand, sand
 Clay: 3 to 15 percent
 Reaction: neutral to strongly alkaline

Bk horizon

Hue: 5YR, 7.5YR
 Value: 4 to 7 dry, 4 or 5 moist
 Chroma: 4 or 6, dry or moist
 Textures: fine sandy loam, sandy loam
 Clay: 12 to 18 percent
 Reaction: neutral to strongly alkaline
 Calcium carbonate equivalent: 5 to 15 percent

Calcic horizon—the zone from 32 to 44 inches (Bk horizon)

63—Urban land-Sheppard-Typic Torriorthents complex, 1 to 10 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 4,500 to 4,600 feet (1,372 to 1,402 meters)

Mean annual precipitation: 6 to 10 inches (152 to 254 millimeters)

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Frost-free period: 150 to 180 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-2AZ Colorado Plateau Cold Desert Shrub

Map Unit Composition

Urban land: 35 percent

Sheppard and similar soils: 30 percent

Typic Torriorthents and similar soils: 25 percent

Minor Components: 10 percent

- Rock outcrop
- Moderately deep and deep Typic Torripsamments
- Active dunes and sand sheets

Soil Properties and Qualities

Urban land

Land mostly covered by streets, parking lots, buildings, and other structures of urban areas.

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments

Geomorphic position: occurs on sand sheets and stabilized dunes on mesa summits

Parent material: eolian sands derived from sandstone

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Surface crust

weak thin platy structure

Physical cover

canopy plant cover: 30 percent

woody debris: 10 percent

bare soil: 60 percent

rock fragments: 0 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Ephedra, Indian ricegrass, narrowleaf yucca, sand dropseed, sand sagebrush

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 51' 50.40" north, 111° 26' 42.80" west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 3 percent clay; weak medium platy structure; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; slightly effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

C1—1 inch to 22 inches (3 to 56 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; few fine dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C2—22 to 60 inches (56 to 152 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; few fine and medium dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

A and C horizons

Hue: 5YR, 7.5YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: fine sand, sand

Clay: 1 to 6 percent

Reaction: moderately alkaline or strongly alkaline

Typic Torriorthents soils

Taxonomic classification: Typic Torriorthents

Geomorphic position: occurs on sand sheets on mesa summits

Parent material: eolian sands derived from sandstone over residuum weathered from sandstone and shale

Slope: 1 to 7 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Surface crust

weak thin platy structure

Physical cover

canopy plant cover: 87 percent

woody debris: 10 percent

bare soil: 10 percent

rock fragments

- gravel: 3 percent

Depth to restrictive feature(s): 5 to 30 inches to bedrock, paralithic

Drainage class: somewhat excessively drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Available water capacity total inches: 2.3 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: blackbrush, broom snakeweed

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System:

36° 51' 37.50" north, 111° 26' 58.70" west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 4 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; noneffervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C1—1 inch to 5 inches (3 to 13 cm); red (2.5YR 4/6) loamy fine sand, dark red (2.5YR 3/6), moist; 8 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—5 to 9 inches (13 to 23 cm); red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6), moist; 25 percent clay; weak medium subangular blocky structure; soft, very friable, slightly sticky and very plastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

C3—9 to 18 inches (23 to 46 cm); red (2.5YR 4/6) channery sandy clay loam, dark red (2.5YR 3/6), moist; 20 percent clay; massive; soft, very friable, slightly sticky and very plastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; 25 percent channer; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Cr—18 inches (46 cm); fractured, weathered sandstone, mudstone, and shale bedrock.

Range in Characteristics

Typic Torriorthents have soil properties that vary outside of family class limits.

A and C1 horizons

Hue: 2.5YR, 5YR

Value: 4 to 6 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: loamy fine sand, fine sand, sand

Clay: 2 to 10 percent

Reaction: moderately alkaline or strongly alkaline

C2 and C3 horizons

Hue: 2.5YR, 5YR

Value: 3 to 6, dry or moist

Chroma: 4 or 6, dry or moist
 Texture: sandy clay loam, sandy loam
 Clay: 15 to 30 percent
 Reaction: moderately alkaline or strongly alkaline

64—Urban land-Ustic Haplocambids complex, 1 to 5 percent slopes

Map Unit Setting

Landform(s): mesas
Elevation: 6,000 to 6,100 feet (1,829 to 1,859 meters)
Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)
Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35; Colorado Plateau
Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Urban land: 60 percent
 Ustic Haplocambids and similar soils: 30 percent
 Minor Components: 10 percent

- Moderately deep and deep Ustic Torriorthents
- Active dunes and sand sheets

Soil Properties and Qualities

Urban land

Land mostly covered by streets, parking lots, buildings, and other structures of urban areas.

Ustic Haplocambids soils

Taxonomic classification: Ustic Haplocambids
Geomorphic position: occurs on stabilized dunes and sand sheets on mesa summits
Parent material: eolian deposits derived from sandstone and shale over residuum weathered from sandstone and shale
Slope: 1 to 5 percent
Surface cover:

- Biological crust
 - cyanobacteria: 0 percent
 - lichen: 0 percent
 - moss: 0 percent
- Chemical crust
 - salt: 0 percent
 - gypsum: 0 percent
- Surface crust
 - weak thin platy structure
- Physical cover
 - canopy plant cover: 30 percent
 - woody debris: 10 percent
 - bare soil: 60 percent
 - rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 0.00 to 5.95 inches per hour (0.01 to 42.00 micrometers per second)

Available water capacity total inches: 9.2 (high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, blackbrush, fourwing saltbush, rabbitbrush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 34' 22.00" north, 111° 5' 15.40" west

A—0 to 3 inches (0 to 8 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 12 percent clay; weak coarse granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; slightly effervescent; slightly alkaline, pH 7.4; clear smooth boundary.

Bk—3 to 10 inches (8 to 25 cm); red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6), moist; 25 percent clay; moderate medium subangular blocky structure; hard, friable, nonsticky and slightly plastic; common very fine and few fine roots throughout; few very fine, fine, and medium dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent, 7 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; gradual wavy boundary.

C1—10 to 28 inches (25 to 71 cm); yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6), moist; 25 percent clay; massive; hard, very friable, nonsticky and slightly plastic; few fine roots throughout; few very fine and fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

C2—28 to 43 inches (71 to 109 cm); reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4), moist; 55 percent clay; massive; extremely hard, friable, moderately sticky and very plastic; few very fine roots throughout; few very fine dendritic tubular pores; few carbonate coats on all faces of peds; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C3—43 to 52 inches (109 to 132 cm); yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6), moist; 45 percent clay; massive; very hard, very friable, moderately sticky and very plastic; few fine dendritic tubular pores; few fine carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C4—52 to 60 inches (132 to 152 cm); yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6), moist; 35 percent clay; massive; very hard, very friable, nonsticky and moderately plastic; few very fine dendritic tubular pores; few carbonate coats on all faces of peds; violently effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

Ustic Haplocambids have soil properties that vary outside of the family class limits.

A horizon

Value: 4 or 5, dry or moist

Texture: sandy loam, fine sandy loam, loamy fine sand

Clay: 8 to 20 percent

Reaction: slightly alkaline or moderately alkaline

Bk horizon

Hue: 2.5YR, 5YR

Texture: sandy clay loam, fine sandy loam

Clay: 15 to 30 percent

Reaction: slightly alkaline or moderately alkaline

Calcium carbonate equivalent: 5 to 15 percent

C horizons

Hue: 2.5YR, 5YR

Value: 4 to 6 dry, 3 to 6 moist

Chroma: 4 or 6, dry or moist

Texture: fine sandy loam, clay, sandy clay loam

Clay: 15 to 55 percent

Reaction: slightly alkaline or moderately alkaline

Cambic horizon—the zone from 3 to 10 inches (Bk horizon)

65—Ustic Haplargids-Mido-Campanile complex, 0 to 7 percent slopes

Map Unit Setting

Landform(s): fan remnants

Elevation: 5,800 to 6,100 feet (1,768 to 1,859 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Ustic Haplargids and similar soils: 35 percent

Mido and similar soils: 30 percent

Campanile and similar soils: 20 percent

Minor Components: 15 percent

- Pensom and similar soils
- Soils that have a rare, brief ponding hazard
- Rock outcrop

Soil Properties and Qualities

Ustic Haplargids soils

Taxonomic classification: Ustic Haplargids

Geomorphic position: occurs on stream terraces on fan remnants

Parent material: alluvium derived from sandstone and siltstone

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust
 salt: 0 percent
 gypsum: 0 percent
Physical cover
 canopy plant cover: 10 percent
 woody debris: 15 percent
 bare soil: 80 percent
 rock fragments: 0 percent
Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Available water capacity total inches: 6.6 (moderate)
Shrink-swell potential: about 5.0 LEP (moderate)
Flooding hazard: none
Runoff class: low
Hydrologic group: C
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: broom snakeweed, prickly Russian thistle, pricklypear and cholla
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 27' 52.00" north, 110° 52' 57.20" west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 4/6) sandy loam, dark reddish brown (5YR 3/4), moist; 18 percent clay; weak thick platy structure; soft, very friable, slightly sticky and nonplastic; common very fine roots throughout; few very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

Bt—1 inch to 8 inches (3 to 20 cm); yellowish red (5YR 4/6) sandy clay loam, red (2.5YR 4/6), moist; 25 percent clay; weak medium angular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots throughout; common very fine and few fine dendritic tubular pores; few faint clay films; few very fine and fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

2C1—8 to 25 inches (20 to 64 cm); yellowish red (5YR 4/6) loamy sand, red (2.5YR 4/8), moist; 10 percent clay; weak coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and medium and common fine roots throughout; common very fine and fine, and few medium and coarse dendritic tubular pores; few very fine and fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

3C2—25 to 37 inches (64 to 94 cm); red (2.5YR 5/6) loamy sand, red (2.5YR 4/6), moist; 8 percent clay; weak coarse prismatic structure; moderately hard, very friable, nonsticky and nonplastic; common very fine and few fine roots throughout; many very fine, and few fine dendritic tubular pores; few very fine and fine carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

4C3—37 to 44 inches (94 to 112 cm); yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6), moist; 20 percent clay; massive; moderately hard, very friable, slightly sticky and very plastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

4C4—44 to 57 inches (112 to 145 cm); red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6), moist; 30 percent clay; massive; moderately hard, very friable, slightly sticky and very plastic; common very fine and few fine roots throughout; few very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

5C5—57 to 60 inches (145 to 152 cm); yellowish red (5YR 5/8) sand, yellowish red (5YR 4/6), moist; 3 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Range in Characteristics

Ustic Haplargids have soil properties that vary outside of family class limits.

A horizon

Hue: 2.5YR, 5YR
 Value: 4 to 6 dry, 3 to 6 moist
 Chroma: 4 or 6, dry or moist
 Texture: sandy loam, very fine sandy loam
 Clay: 15 to 20 percent
 Reaction: slightly alkaline or moderately alkaline

Bt horizon

Hue: 2.5YR, 5YR
 Value: 4 to 6, dry or moist
 Chroma: 4 to 8 dry, 4 or 6 moist
 Clay: 20 to 30 percent
 Reaction: slightly alkaline or moderately alkaline

2C1 through 5C5 horizons

Hue: 2.5YR, 5YR, 7.5YR
 Value: 4 to 6, dry or moist
 Chroma: 4 to 8 dry, 4 or 6 moist
 Texture: sandy clay loam, loamy sand, sand, sandy loam
 Clay: 1 to 35 percent
 Reaction: slightly alkaline or moderately alkaline

Argillic horizon—the zone from 1 inch to 8 inches (Bt horizon)

Mido soils

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on stabilized dunes and sand sheets on fan remnants

Parent material: alluvium derived from sandstone and siltstone

Slope: 1 to 7 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent

Chemical crust

salt: 0 percent
 gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent
 woody debris: 15 percent
 bare soil: 75 percent
 rock fragments: 0 percent

Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 3.6 (low)
Shrink-swell potential: about 2.0 LEP (low)
Flooding hazard: none
Runoff class: very low
Hydrologic group: A
Ecological site name: not provided
Ecological site number: not provided
Present vegetation: Utah juniper, broom snakeweed, prickly Russian thistle,
pricklypear and cholla
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 27' 45.20" north, 110° 53' 7.80" west

C1—0 to 4 inches (0 to 10 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots throughout; few very fine and fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—4 to 9 inches (10 to 23 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C3—9 to 26 inches (23 to 66 cm); yellowish red (5YR 4/6) loamy sand, dark reddish brown (5YR 3/4), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; few fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C4—26 to 37 inches (66 to 94 cm); yellowish red (5YR 4/6) loamy sand, dark reddish brown (5YR 3/4), moist; 4 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; few fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C5—37 to 60 inches (94 to 152 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 8 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots throughout; few fine dendritic tubular pores; strongly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

C horizons

Hue: 2.5YR, 5YR

Value: 3 to 6, dry or moist

Chroma: 4 to 8 dry, 4 or 6 moist

Texture: loamy sand, sandy loam, sand

Clay: 1 to 10 percent

Reaction: slightly alkaline to strongly alkaline

Campanile soils

Taxonomic classification: Fine, mixed, superactive, mesic Chromic Haplotorrerts

Geomorphic position: occurs on stream terraces and alluvial fans on fan remnants

Parent material: alluvium derived from sandstone and siltstone

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 5 percent

woody debris: 5 percent

bare soil: 95 percent

rock fragments: 0 percent

Drainage class: somewhat poorly drained

Ksat solum: 0.00 to 0.20 inches per hour (0.01 to 1.40 micrometers per second)

Available water capacity total inches: 9.9 (high)

Shrink-swell potential: about 11.0 LEP (very high)

Flooding hazard: none

Runoff class: negligible

Hydrologic group: D

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: prickly Russian thistle

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 26' 59.80" north, 110° 52' 49.40" west

Css—0 to 11 inches (0 to 28 cm); red (2.5YR 5/6) clay, red (2.5YR 4/6), moist; 61 percent clay; weak medium wedge and weak fine wedge structure; hard, very friable, moderately sticky and very plastic; few very fine, fine, and medium roots throughout; few very fine and fine dendritic tubular pores; few distinct pressure faces and few distinct slickensides (pedogenic); strongly effervescent; strongly alkaline, pH 8.6; abrupt wavy boundary.

C1—11 to 37 inches (28 to 94 cm); red (2.5YR 5/6) clay, red (2.5YR 4/6), moist; 57 percent clay; massive; very hard, friable, moderately sticky and very plastic; few very fine and fine roots throughout; few very fine dendritic tubular pores; few distinct pressure faces; strongly effervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

C2—37 to 66 inches (94 to 168 cm); red (2.5YR 5/6) clay, red (2.5YR 4/6), moist; 54 percent clay; massive; hard, friable, moderately sticky and very plastic; few distinct pressure faces; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Css and C horizons

Hue: 2.5YR, 5YR, 7.5YR

Value: 4 to 6, dry or moist

Chroma: 4 or 6, dry or moist

Texture: sandy clay, clay, clay loam, sandy clay loam

Clay: 30 to 65 percent

Reaction: moderately alkaline or strongly alkaline

Cracks: at least 0.2 inches wide to a depth of 12 inches or more, often extending to depths greater than 50 inches

66—Ustic Torriorthents-Pits, mine complex, 2 to 35 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 6,400 to 6,990 feet (1,950 to 2,130 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Ustic Torriorthents and similar soils: 50 percent

Pits, mine, coal: 30 percent

Minor Components: 20 percent

- Rizno and similar soils
- Riverwash
- Moenkopie and similar soils

Soil Properties and Qualities

Ustic Torriorthents soils

Taxonomic classification: Ustic Torriorthents

Geomorphic position: occurs on mesa summits

Parent material: residuum weathered from sandstone and shale

Slope: 2 to 35 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 10 percent

bare soil: 30 percent

rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)

Available water capacity total inches: 6.3 (moderate)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: B

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, blackbrush, fourwing saltbush, rabbitbrush

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 32' 23.10" north, 110° 25' 3.50" west

^Ap—0 to 12 inches (0 to 30 cm); brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4), moist; 20 percent clay; moderate medium granular structure; hard, friable, slightly sticky and slightly plastic; many very fine and few medium roots throughout; 10 percent gravel and 3 percent cobble; strongly effervescent; neutral, pH 7.3; clear smooth boundary.

^C1—12 to 26 inches (30 to 66 cm); grayish brown (10YR 5/2) gravelly loam, gray (10YR 5/1), moist; 24 percent clay; massive; very hard, friable, moderately sticky and moderately plastic; many very fine and fine roots throughout; 20 percent gravel, 10 percent cobble, and 1 percent stone; noneffervescent; neutral, pH 7.0; gradual wavy boundary.

^C2—26 to 60 inches (66 to 152 cm); dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2), moist; 24 percent clay; massive; very hard, friable, moderately sticky and moderately plastic; few very fine roots throughout; 20 percent gravel, 15 percent cobble, and 1 percent stone; very slightly effervescent; neutral, pH 6.9.

Range in Characteristics

Reclaimed lands: surface strip mining, consist of top soil and overburden removal and replacement.

Ustic Torriorthents have soil properties that vary outside of the family class limits.

^Ap horizon

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 1 to 4 dry, 2 to 4 moist

Texture: sandy loam, loam, clay loam, clay

Clay: 12 to 40 percent

Reaction: neutral or slightly alkaline

Rock fragments: 5 to 35 percent gravel, 0 to 5 percent cobbles

^C horizons

Hue: 7.5YR, 10YR

Value: 5 to 7 dry, 3 or 4 moist

Chroma: 1,2 or 4 dry, 1 to 4 moist

Texture: sandy loam, loam, sandy clay loam, clay loam, sandy clay, clay

Clay: 16 to 45 percent

Reaction: neutral or slightly alkaline

Rock fragments: 10 to 50 percent gravel, 5 to 35 percent cobble, 0 to 10 percent stones

Disturbed lands: reclaimed mine lands. Hills and ridges replaced with gradual slopes consisting of mixed earthy materials. Additional soils information can be obtained from The Peabody Western Coal Company, Black Mesa Complex, P.O. Box 650, Kayenta, Arizona 86033.

Pits, mine, coal**Range in Characteristics**

Disturbed surface strip mined lands. Wepo Formation sandstone and shale.

67—Ustic Torriorthents-Rock outcrop complex, 2 to 65 percent slopes**Map Unit Setting**

Landform(s): escarpments

Elevation: 6,100 to 7,100 feet (1,859 to 2,164 meters)

Mean annual precipitation: 10 to 14 inches (254 to 356 millimeters)

Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)

Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)

Frost-free period: 135 to 165 days

Major Land Resource Area: 35; Colorado Plateau

Land Resource Unit: 35-3AZ Colorado Plateau Sagebrush–Grassland

Map Unit Composition

Ustic Torriorthents and similar soils: 80 percent

Rock outcrop: 15 percent

Minor Components: 5 percent

- Lithic Torriorthents and similar soils
- Riverwash
- Gullied land

Soil Properties and Qualities**Ustic Torriorthents soils**

Taxonomic classification: Ustic Torriorthents

Geomorphic position: occurs on fan remnants on mesa escarpments

Parent material: colluvium derived from sandstone and/or colluvium derived from shale

Slope: 2 to 65 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 5 percent

bare soil: 70 percent

rock fragments

- gravel: 20 percent

- cobble: 5 percent

- stone: 3 percent

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Available water capacity total inches: 6.8 (moderate)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

Ecological site name: not provided

Ecological site number: not provided

Present vegetation: Utah juniper, pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System:

36° 30' 30.10" north, 110° 4' 32.00" west

A—0 to 6 inches (0 to 15 cm); light olive brown (2.5Y 5/4) very gravelly loam, olive brown (2.5Y 4/4), moist; 15 percent clay; weak very fine granular structure; soft, very friable, slightly sticky and moderately plastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; 35 percent gravel, 10 percent cobble, and 3 percent stone; violently effervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

C1—6 to 30 inches (15 to 76 cm); light yellowish brown (2.5Y 6/3) extremely gravelly sandy clay loam, light olive brown (2.5Y 5/4), moist; 30 percent clay; weak coarse subangular blocky structure; moderately hard, friable, moderately sticky and very plastic; few very fine, fine, medium, and very coarse roots throughout; few very fine and fine dendritic tubular pores; common medium and coarse carbonate masses in matrix; 40 percent gravel, 15 percent cobble, and 5 percent stone; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C2—30 to 42 inches (76 to 107 cm); light yellowish brown (2.5Y 6/4) sandy clay loam, light olive brown (2.5Y 5/4), moist; 30 percent clay; massive; slightly hard, very friable, moderately sticky and very plastic; few very fine and fine roots throughout; few very fine and fine dendritic tubular pores; common fine and medium carbonate masses in matrix; 4 percent gravel; violently effervescent; strongly alkaline, pH 8.6; abrupt smooth boundary.

C3—42 to 51 inches (107 to 130 cm); yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4), moist; 15 percent clay; massive; slightly hard, very friable, moderately sticky and very plastic; few very fine and fine roots throughout; common very fine and fine dendritic tubular pores; common fine carbonate masses in matrix; 4 percent gravel; strongly effervescent; moderately alkaline, pH 8.2; gradual smooth boundary.

C4—51 to 60 inches (130 to 152 cm); yellowish brown (10YR 5/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4), moist; 25 percent clay; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; common very fine dendritic tubular pores; common fine and medium carbonate masses in matrix; 20 percent gravel; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Ustic Torriorthents have soil properties that vary outside of family class limits.

A horizon

Hue: 7.5YR, 10YR, 2.5Y

Value: 4 to 6, dry or moist

Chroma: 2 to 4, dry or moist
Texture: sandy loam, loam
Clay: 8 to 20 percent
Reaction: slightly alkaline to strongly alkaline

C horizons

Hue: 7.5YR, 10YR, 2.5Y
Value: 3 to 6, dry or moist
Chroma: 2 to 4, dry or moist
Texture: sandy loam, fine sandy loam, loam, sandy clay loam
Clay: 15 to 30 percent
Reaction: slightly alkaline to strongly alkaline

Rock outcrop

Exposures of flat or rolling bedrock, typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material.

68—Water

Streams, lakes, and ponds. These areas are covered with water in most years, at least during the period that is warm enough for plants to grow. Many areas are covered throughout the year.

Formation of the Soils

Soil is a natural, three-dimensional body on the surface of the earth that supports plants. Although the soil mantle on the earth's surface varies widely in many places, all soils consist of minerals, organic matter, living organisms, water, and air. These components occur in varying amounts in different soils.

Soil results from the action of soil-forming processes on materials deposited or accumulated by geological processes. The characteristics of the soil at any given point are determined by five factors: (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material accumulated and has existed since accumulation, (3) the plant and animal life on and in the soil, (4) the topography, or lay of the land, and (5) the length of time that the forces of soil formation have acted on the parent material (Jenny, 1980). These factors of soil formation are independent, and few generalizations can be made regarding any one factor unless the effects of the others are known (Gile, 1965).

Parent Material

Parent material is the unconsolidated material in which the soil forms. It may have weathered in place from rock, or it may have been transported by water, wind, or ice. The parent material of the soils in the survey area was derived from several sources and types of bedrock. Parent material can be put into six general groups: residuum, colluvium, slope alluvium, fan alluvium, stream alluvium, and eolian sand. Soils can form from a single parent material or a combination of parent materials.

Residuum is unconsolidated, weathered, or partly weathered mineral material that accumulated by the disintegration of bedrock in place.

Colluvium is unconsolidated earth materials deposited on and at the base of moderately steep and steep slopes by mass wasting (direct gravitational action) and local runoff.

Alluvium is unconsolidated material that has been deposited by running water. It includes gravel, sand, silt, and clay, alone and in various mixtures. Slope alluvium is moved from steep slopes to more gentle slopes. Fan alluvium is moved along alluvial fans. Stream alluvium is deposited by streams. Alluvial parent material can come from more than one source.

Eolian parent material pertains to material transported and deposited by the wind. It results in dune formations.

Climate

Climate is a major factor in soil formation. Temperature, precipitation, humidity, and wind affect vegetation (biological activity), parent material, and soil drainage. These factors influence the accumulation of organic matter, leaching of salts, the type and rate of weathering of the soil mineral constituents, and the development of diagnostic soil features.

Plant and Animal Life

The effects of plants, animals, and humans are important in soil formation. Where the temperature is suitable, plants begin to grow as soon as they receive suitable amounts of water and nutrients. Plants, including fungi, influence soil formation by returning residues to the soil and aiding in decomposition. Plants influence the temperature of the soil by providing shade during warm periods and by helping to reduce evaporation from the soil surface. Vegetation also affects the transfer of minerals within the soil, the soil pH, and, in conjunction with climate and topography, the movement of material by leaching.

Bacteria, nematodes, and other forms of animal life aid in the weathering of minerals and the decomposition of organic matter. The larger animals, such as ants, earthworms, gophers, skunks, and reptiles, alter the soil by turning and mixing it during burrowing activities.

Humans can have a strong influence on soil formation. Tillage and overgrazing may accelerate erosion. Changes in drainage conditions or topography induced by land shaping also influence the soil. Modifications in natural fertility by fertilizers, incorporation of organic residues, or cropping practices can also alter the soil-forming process.

As a rule, humans, plants, animals, insects, bacteria, and fungi affect the formation of soils by increasing the content of organic matter, producing gains or losses in plant nutrients, mixing soil layers, and changing structure and porosity.

Topography

Topography and runoff influence the formation of soils by affecting drainage, erosion, soil temperature, and plant cover. The thickness and kind of soil horizons depend on the amount of water that percolates through the parent material. Normally, more water enters a soil that is nearly level or gently.

The amount of runoff depends on the slope. Steeper slopes have a higher amount of runoff than do gentle slopes. Coarse-textured soils take in water more rapidly than do fine-textured soils. Less water is lost through runoff on slopes that have coarse textured soils than on those having fine-textured soils.

Aspect affects soil formation in the moderate to high elevations. Soils are slightly deeper on the north- and east-facing slopes because rainfall is more effective, temperatures are cooler, and plants are more numerous.

Time

The soils of the area range from very old to very young. The kind of horizons and the degree of soil formation depend in part on how long the soil has remained stable.

The youngest soils that show the least development are on flood plains and stream terraces. The parent material of these soils has been in place for only a short period.

Soils on alluvial fans and fan remnants show greater development. Deposition of parent material still occurs on alluvial fans. Fan remnants are relict alluvial fans that have been dissected and no longer have active deposition of parent material. Argillic horizons have developed, and calcium carbonate is accumulating. The older soils in this group are generally higher in clay and redder in color.

Landforms of the Survey Area

The survey area is part of the Colorado Plateau physiographic province, which is generally characterized by rough, broken terrain, including small, steep mountainous areas, plateaus, cuestas, and mesas intermingled with steep canyon walls,

escarpments, and valleys. The following are typical landforms recognized in the survey area. Landforms are not static; they are continually being created and eroded.

Alluvial Fans

Alluvial fans originate from erosional sediments derived from upslope landforms. Sediment loads are deposited when slope gradients change from upland positions to less sloping landforms. An inherent feature of fan development is the continuously changing pattern of channels and loci of deposition (Cooke and Warren, 1973). Over a long period of time, these changes ensure the maintenance of the alluvial fans by continually distributing material widely over the surface. The soils on this landform are generally very deep, and their textures are highly variable, depending on the local geology of the source alluvium. Soil parent material is typically considered fan alluvium or alluvium.

Canyons

Canyons are long, deep, narrow, very steep-sided valleys cut primarily into bedrock with high and precipitous walls, and often with a perennial stream at the bottom. A canyon is similar to but larger than a gorge. Most of the canyons on the Navajo Mountain Soil Survey create impassible terrain where elevations drop as much as 1,400 feet to the canyon bottom. These typically occur in one of three geologies; Navajo Sandstone, Kayenta Formation, or Entrada Sandstone, all of Jurassic age geology.

Dunes and Sand Sheets

These landforms developed from Holocene-age and present-day eolian sands. Dunes and sand sheets in the context of landforms are not the same as Dune land. Dune land is considered a miscellaneous area and consists of sand in ridges and intervening troughs that shift with the wind. Dune land is almost always devoid of vegetation, or at the most it has pioneer species. Most dunes in the area have been stabilized by the establishment of vegetation that restricts dune activity. Relatively small transverse dunes form perpendicular to the prevailing winds, and longitudinal dunes form parallel to the prevailing wind. Dunes may be found as a component on other landforms described in this section. Soils on dune landforms can be very deep and located in large dune fields or they can occur as a shallow mantle over bedrock controlled surfaces. Soil parent material is considered eolian material.

Escarpments

Escarpments are a familiar feature in the survey area. They are relatively steep slopes or cliffs produced by erosion and faulting. Because of the steepness of the slopes, the soils formed on this landform are generally shallow but can be very deep. Escarpments can be a landform component associated with plateaus, cuestas, or mesas. Soil parent material is typically considered colluvium, although slope alluvium and residuum may also occur.

Fan Remnants and Fan Terraces

Fan remnants are alluvial fans that have been dissected, or downcut, to the point at which flooding rarely occurs. Fan remnant landforms have two important components: the summit, known as the tread, where erosional activity is relatively low; and the side slope, known as the riser, where erosion is cutting into the more stable summit. In

most areas of the survey, the surface of the summit has a thick eolian mantle that is being eroded. Soils can exhibit different degrees of development, or pedogenesis, on these landforms. The expression of soil development depends upon the stability of the landform surface. More stable surfaces have more development; less stable or erosional surfaces have less development. Landform stability and the expression of soil development are somewhat directly proportional to the amounts, or expression, of illuviated silicate clay and/or translocated calcium carbonates. Soils on fan remnants can vary greatly in their physical and chemical properties. Soil parent material is considered alluvium or sometimes fan alluvium.

Mesas and Cuestas

These landforms have two important components: the mesa summit and the cuesta dipslope; and the escarpment. The summit and dipslope are both nearly level to gently sloping, bedrock-controlled surfaces that are generally stable. The soils are typically well developed and characterized by well expressed argillic horizons. The escarpment, where erosional activity is cutting back into the more stable summit, has little or no horizon development. Mesas differ from cuestas in that an escarpment terminates the mesa summit on all sides, whereas a cuesta will generally have one or more sides that grade into the surrounding terrain along gentle slopes. Soil parent material is generally residuum on the summit position and colluvium or slope alluvium on the escarpments.

Pediments

Pediments are gently sloping erosional surfaces developed at the foot of a receding hill or mountain slope, commonly with a slightly concave-upward profile, that cross-cuts rock or sediment strata that extend beneath adjacent uplands. The erosion surface may be essentially bare bedrock, or it may be thinly mantled (e.g., 1 to 3 meters) with debris such as colluvium, pedisediment, or alluvium that is in transit from an upland front to basin or valley lowland.

Plateaus

Plateaus are large, comparatively flat areas. Specifically, a plateau is an extensive land region that is considerably elevated above adjacent lower-lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level. Many other landforms can exist on plateaus. Soil parent material is highly variable, depending on whether other landforms exist on the plateau; however, soils on the plateau landform itself typically formed in parent material that derived from residuum or slope alluvium.

Playas

Playas are usually dry and nearly level lake plains that occupy the lowest parts of closed depressions. Temporary flooding occurs primarily in response to precipitation runoff events. Playa deposits are typically fine grained, but might be interlain with coarse-grained textures where deposition alternates between lacustrine sediments and eolian sands. Playas may have a high water table and saline, sodic, or gypsic conditions.

Stream Terraces

This position is the erosional remnant of the active flood plain that existed during the late Pleistocene to Holocene ages. The surface slopes in the same general direction as the flood plain. Soils on stream terraces have typically been stable for a sufficient period of time to form cambic horizons. A cambic horizon is characterized by formation of soil structure and the illuvial concentration of calcium carbonate and sometimes gypsum. Stream terraces may be subject to rare or very rare flooding during unusual weather events. These occurrences and the thin alluvial deposits from the floodwaters do not inhibit soil development. The soils in this position are underlain by stratified sandy, gravelly, loamy, silty, or clayey sediments, and in some cases by buried paleosols. The parent material is considered alluvium.

References

Cooke, Ronald U. and Andrew Warren. 1973. *Geomorphology in deserts. Part 1—The desert context.* University of California Press, Berkeley, California.

Gile, Leland H., Frederick F. Peterson, and Robert B. Grossman. 1965. Morphological and genetic sequences of carbonate accumulations. *Soil Science* 101, pp. 347-360.

Jenny, Hans. 1980. The soil resource—Origin and behavior. *Ecological Studies* 37.

Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the “National Soil Survey Handbook” (available in local offices of the Natural Resources Conservation Service or on the Internet).

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial fan. A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces. Also called slope aspect.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Butte. An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

- Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.
- Canopy.** The leafy crown of trees or shrubs. (See Crown.)
- Canyon.** A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
- Coarse textured soil.** Sand or loamy sand.
- Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.
- Colluvium.** Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.
- Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.
- Concretions.** See Redoximorphic features.
- Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.
- Cuesta.** A hill or ridge that has a gentle slope on one side and a steep slope on the other; specifically, an asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.
- Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.
- Drainage class (natural).** Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”
- Dune.** A low mound, ridge, bank or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.
- Ecological site.** An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.
- Eolian deposit.** Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.
- Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion surface. A land surface shaped by the action of erosion, especially by running water.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Fan remnant. A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

Fine textured soil. Sandy clay, silty clay, or clay.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. The nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Gravel. Rounded or angular fragments of rock as much as 3 inches (7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon. —An organic layer of fresh and decaying plant residue.

A horizon. —The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon. —The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon. —The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon. —The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon. —Soft, consolidated bedrock beneath the soil.

R layer. —Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential.

The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Ksat. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Leaching. The removal of soluble material from soil or other material by percolating water.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Masses. See Redoximorphic features.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, hardpan, fragipan, claypan, plowpan, and traffic pan.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inches
Very slow	0.0015 to 0.06 inches
Slow	0.06 to 0.2 inches
Moderately slow	0.2 to 0.6 inches
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Plateau (geomorphology). A comparatively flat area of great extent and elevation; specifically, an extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors.

Temporary flooding occurs primarily in response to precipitation and runoff.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A

soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, step like landforms, such as successive stream terraces.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeters to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a

similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope alluvium. Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished pedis and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream. It represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble

and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace (geomorphology). A step-like surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

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SOIL LEGEND

SYMBOL	NAME
1	Aneth-Marcou-Typic Calcigypsid complex, 2 to 5 percent slopes
2	Arabrab-Vessilla-Lindrith complex, 1 to 45 percent slopes
3	Arches-Pensom, moderately deep-Rock outcrop complex, 2 to 5 percent slopes
4	Aridic Ustorthents-Royosa-Plumasano complex, 0 to 15 percent slopes
5	Begay-Pensom, moderately deep complex, 1 to 10 percent slopes
6	Begay-Tsosie complex, 1 to 5 percent slopes
7	Berryhill family, 0 to 3 percent slopes
8	Councilor-Moclom-Hawaikuh complex, 1 to 60 percent slopes
9	Denazar-Sheppard-Lithic Torriorthents complex, 1 to 20 percent slopes
10	Earlweed-Shoegame complex, 2 to 6 percent slopes
11	Eslendo family-Simel-Pensom complex, 3 to 10 percent slopes
12	Florita, moderately deep-Rizno-Rock outcrop complex, 0 to 5 percent slopes
13	Gish, moderately deep-Reef complex, 1 to 35 percent slopes
14	Gotho-Aneth family complex, 1 to 10 percent slopes
15	Jaconita-Anasazi association, 2 to 20 percent slopes
16	Lithic Haplogypsid-Typic Haplogypsid complex, 2 to 12 percent slopes
17	Lybrook-Tsosie complex, 0 to 8 percent slopes
18	Marcou-Sheppard complex, 1 to 15 percent slopes
19	Marcou-Sheppard-Typic Natrargid complex, 1 to 10 percent slopes
20	Mespin-Bispen-Rock outcrop complex, moist, 1 to 15 percent slopes
21	Mespin-Nalcas-Bispen complex, 0 to 10 percent slopes
22	Mespin-Rock outcrop-Nalcas complex, 1 to 25 percent slopes
23	Mespin-Santrick-Rock outcrop complex, Mormon Ridges, 2 to 40 percent slopes
24	Mespin-Councilor-Mespin, limy substratum complex, 0 to 10 percent slopes
25	Mido, limy substratum-Rizno-Westmion association, 3 to 35 percent slopes
26	Mido, loamy substratum-Arches-Ustic Haplocalcid complex, Crooked Ridge, 2 to 10 percent slopes
27	Mido-Gish, moderately deep-Tekapo family complex, 1 to 10 percent slopes
28	Mido-Radnik-Riverwash complex, 1 to 8 percent slopes
29	Mido-Pensom, moderately deep-Ustic Haplocambid complex, 1 to 10 percent slopes
30	Monue-Monue, moderately deep complex, 1 to 8 percent slopes
31	Needle-Sheppard complex, 2 to 12 percent slopes
32	Pensom-Arches-Rock outcrop complex, 2 to 25 percent slopes
33	Pinavetes-Begay complex, White Mesa, 1 to 5 percent slopes
34	Pinavetes-Pinavetes, moderately deep association, White Mesa, 1 to 15 percent slopes
35	Pinavetes-Rock outcrop complex, White Mesa, 5 to 60 percent slopes
36	Pinepoint-Aridic Ustorthents-Riverwash complex, 1 to 5 percent slopes
37	Pinepoint-Parkwash-Rock outcrop complex, 1 to 10 percent slopes
38	Pocum family-Earlweed complex, 1 to 15 percent slopes
39	Reef-Mido-Zukan complex, 2 to 35 percent slopes
40	Riverwash-Sheppard complex, 0 to 24 percent slopes
41	Rizno-Wayneco-Rock outcrop complex, 1 to 7 percent slopes
42	Rock outcrop-Mathis-Nalcas complex, 10 to 50 percent slopes
43	Rock outcrop-Mido-Mido, loamy substratum complex, 2 to 15 percent slopes
44	Rock outcrop-Needle complex, 2 to 12 percent slopes
45	Rock outcrop-Needle-Lithic Torriorthents complex, 1 to 25 percent slopes
46	Sandoval family-Ustic Haplocambid complex, 0 to 5 percent slopes
47	Sanfeco-Sheppard complex, 1 to 3 percent slopes
48	Santrick-Nalcas-Rock outcrop complex, 1 to 15 percent slopes
49	Sheppard fine sand, 1 to 5 percent slopes
50	Sheppard sand, 5 to 15 percent slopes
51	Sheppard-Massadon-Monue complex, 0 to 10 percent slopes
52	Sheppard-Needle-Rock outcrop complex, 2 to 20 percent slopes
53	Sheppard-Sheppard, gypsic substratum complex, 2 to 11 percent slopes
54	Sheppard-Typic Haplargid complex, 1 to 20 percent slopes
55	Shoegame family, 1 to 5 percent slopes
56	Torriorthents-Rock outcrop complex, 25 to 65 percent slopes
57	Tsaya family-Sheppard, moderately deep-Rock outcrop complex, 2 to 19 percent slopes
58	Typic Haplocambid-Sheppard-Needle complex, 0 to 10 percent slopes
59	Typic Torriorthents, 1 to 5 percent slopes
60	Typic Torriorthents-Needle-Moenkopie family complex, 2 to 12 percent slopes
61	Urban land-Gotho-Tewa complex, 1 to 5 percent slopes
62	Urban land-Nakai complex, 1 to 15 percent slopes
63	Urban land-Sheppard-Typic Torriorthents complex, 1 to 10 percent slopes
64	Urban land-Ustic Haplocambid complex, 1 to 5 percent slopes
65	Ustic Haplargid-Mido-Campanile complex, 0 to 7 percent slopes
66	Ustic Torriorthents-Pits, mine complex, 2 to 35 percent slopes
67	Ustic Torriorthents-Rock outcrop complex, 2 to 65 percent slopes
68	Water

CONVENTIONAL AND SPECIAL
SYMBOLS LEGEND

CULTURAL FEATURES	
BOUNDARIES	
National, state, or province	-- --
County or parish	— —
Reservation (national forest or park, state forest or park)	— — — —
Limit of soil survey (label) and/or denied access area	————
TRANSPORTATION	
Divided roads	=====
Other roads	————
ROAD EMBLEMS AND DESIGNATIONS	
Interstate	 
Federal	 
State	 
County, farm or ranch	

SPECIAL SYMBOLS FOR SOIL
SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS	
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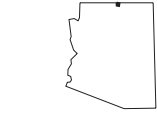


Joins sheet 16
Lees Ferry

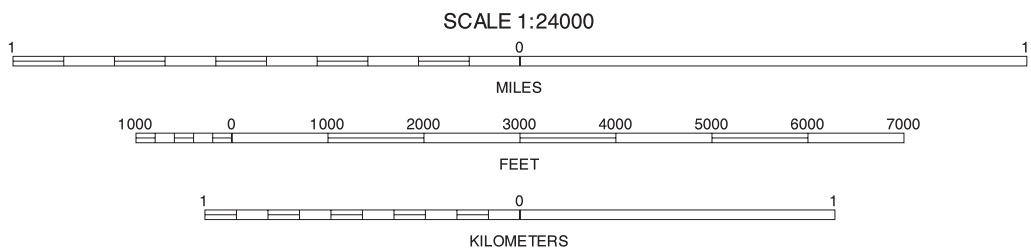
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North American Datum of 1983 (NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



16	17	18	2
16	17	18	2

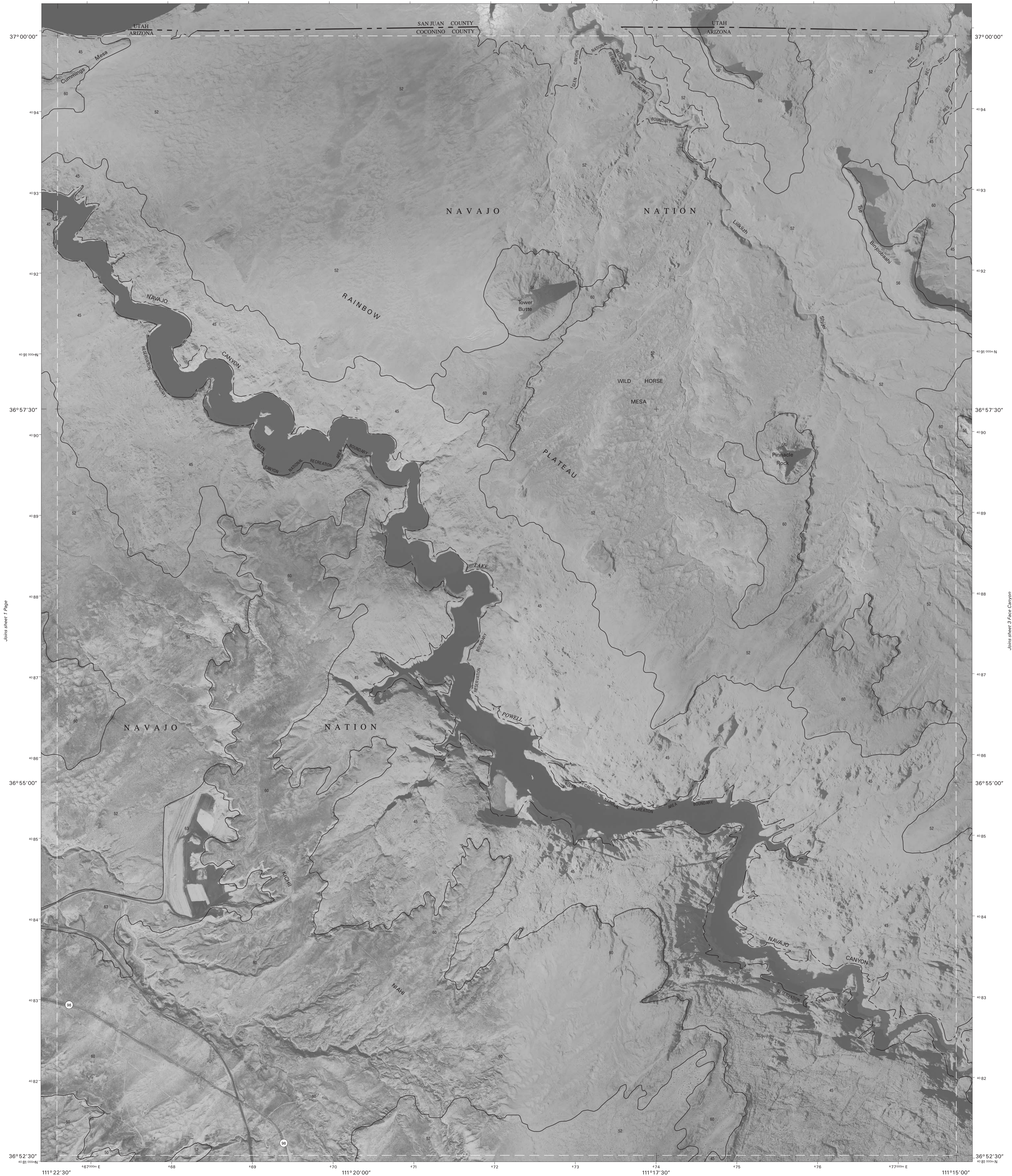
INDEX TO ADJOINING 7.5 MAPS

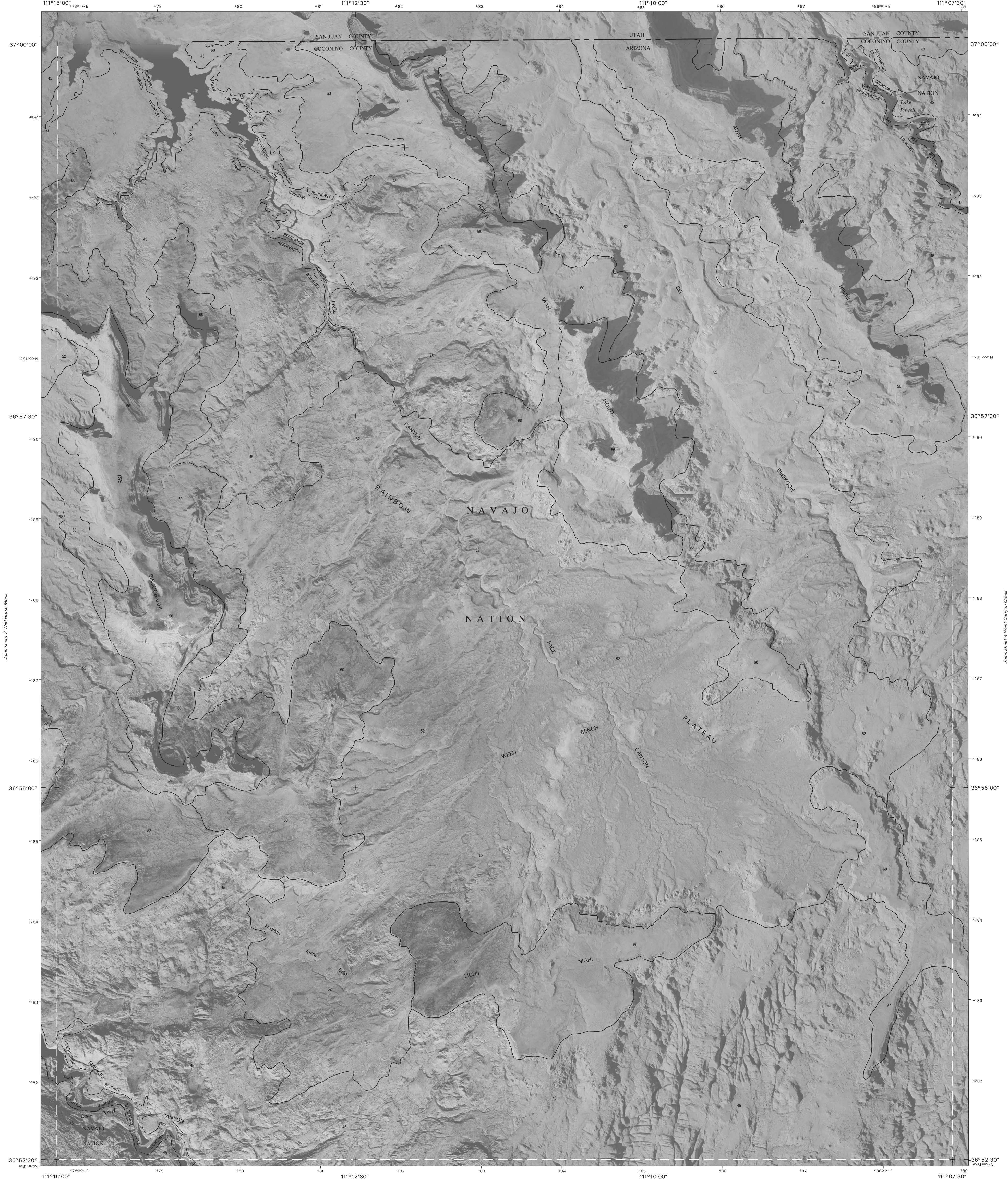
2 WILD HORSE MESA
16 LEES FERRY
17 WHITE DOME
18 LECHÉ ROCK

PAGE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 1 OF 86

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.

Joins sheet 18
Leche Rock





Joins sheet 2 Wild Horse Mesa

Joins sheet 4 West Canyon Creek

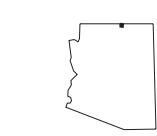
Joins sheet 18
Lake a 6000

Joins sheet 20
See E 6000

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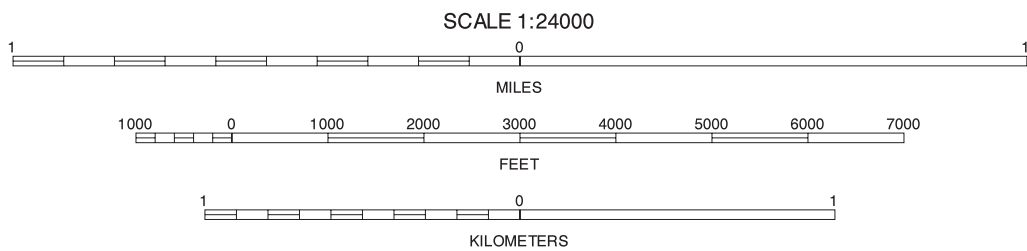
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NORTH



QUADRANGLE LOCATION

Joins sheet 19 Cedar Tree Bench



2	4	18	19	20
2	4	18	19	20

INDEX TO ADJOINING 7.5 MAPS

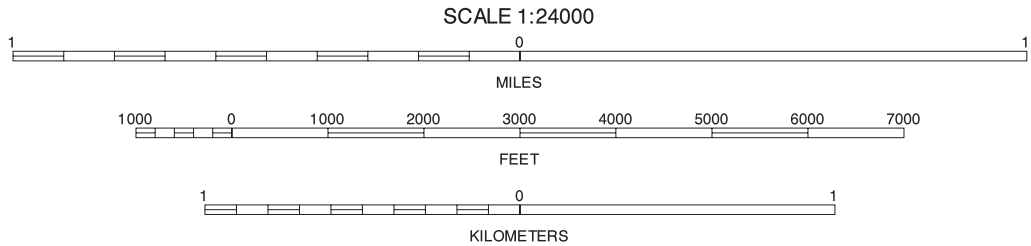
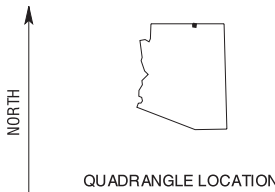
FACE CANYON, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 86

Soil map delineations extending beyond the dashed white quadrangle nealines are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83), GRS80 Spheroid 1000-meter ticks; Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

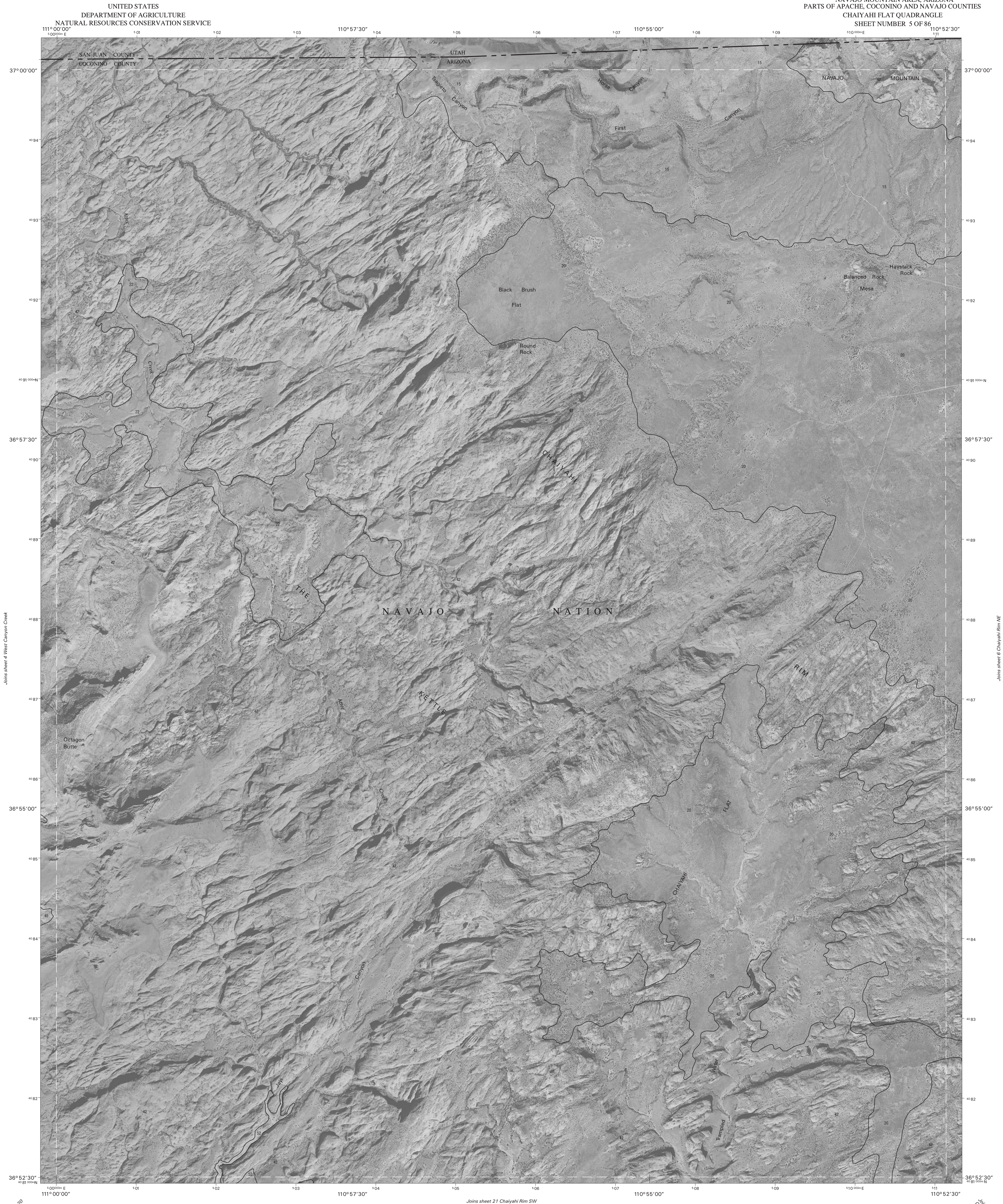


3		5
19	20	21

INDEX TO ADJOINING 7.5 MAPS

WEST CANYON CREEK, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 4 OF 86

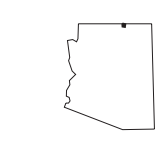
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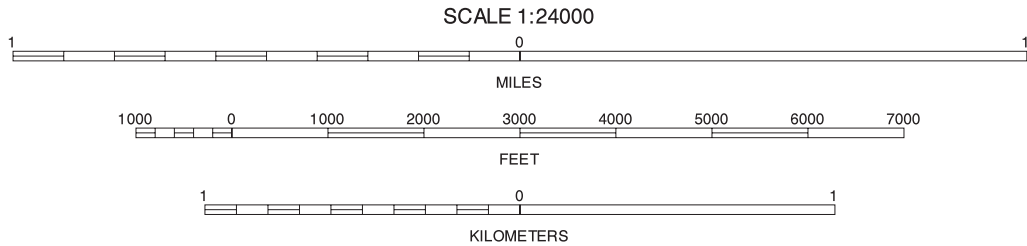
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



4		6	4 WEST CANYON CREEK
			6 CHAIYAHÍ RIM NE
			20 TSE ESGIZI
20	21	22	21 CHAIYAHÍ RIM SW
			22 CHAIYAHÍ RIM SE

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CHAIYAHÍ FLAT, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 5 OF 86

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.

Joins sheet 5 Chaiyahi Flat

Joins sheet 7 Tall Mountain NW

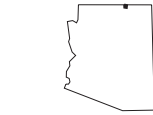


Joins sheet 22
Chaiyahi Rim SW

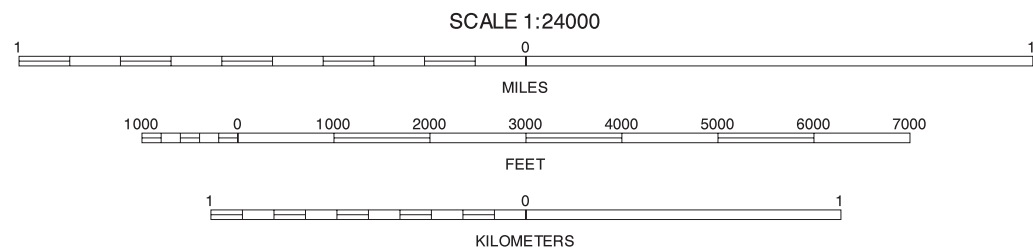
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 2005 aerial photography. Administrative boundaries were acquired from the State of Arizona. Boundaries may have been edited to conform with features represented on the publication orthophotography or to enhance the clarity of the soils information.

North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



Joins sheet 22 Chaiyahi Rim SE

5	7	
21	22	23

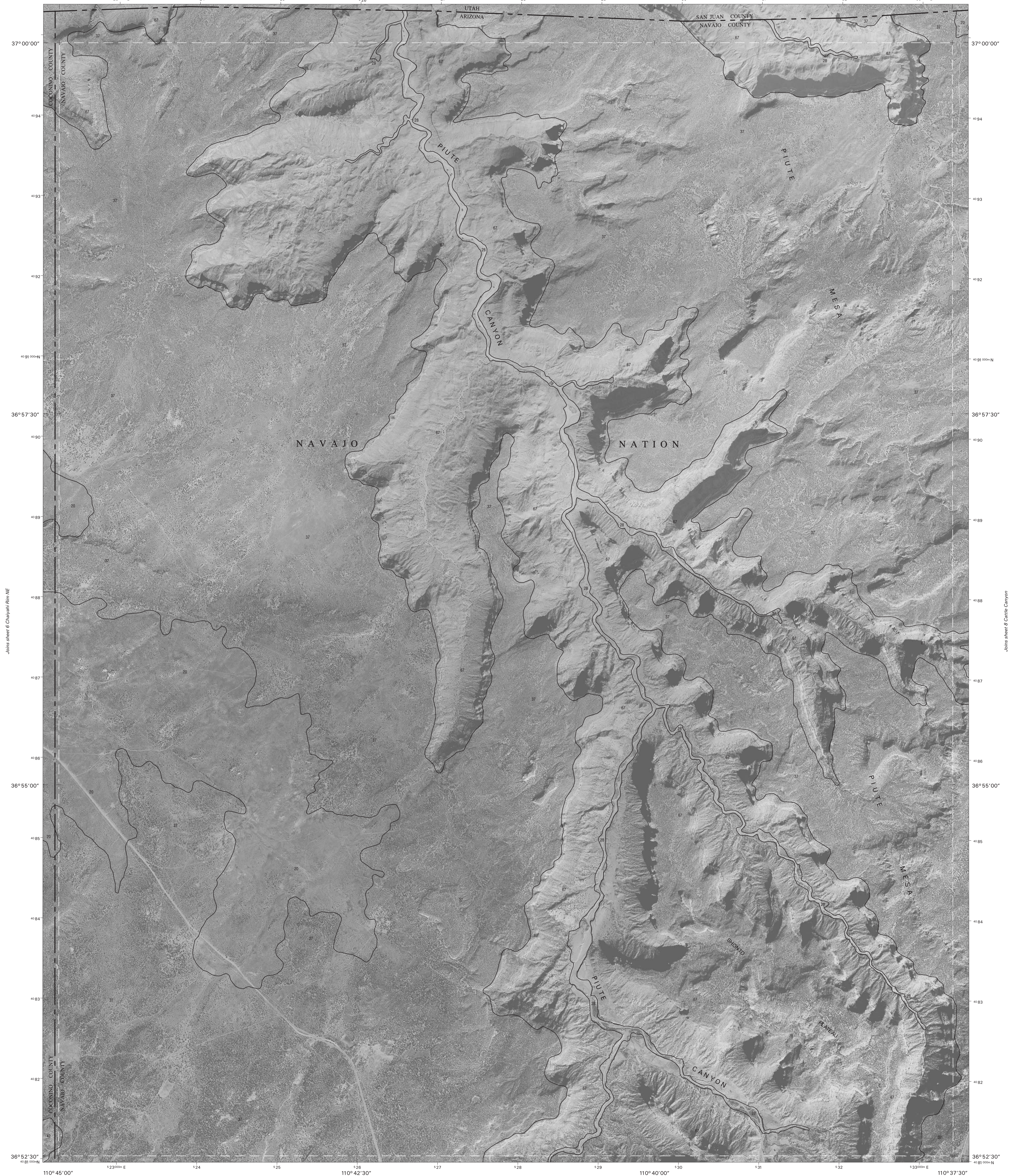
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5 CHAIYAH FLAT
7 TALL MOUNTAIN NW
21 CHAIYAH RIM SW
22 CHAIYAH RIM SE
23 OAK SPRINGS

CHAIYAH RIM NE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 6 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 23
Oak Springs



Joins sheet 6 Chaiyahi Rim NE

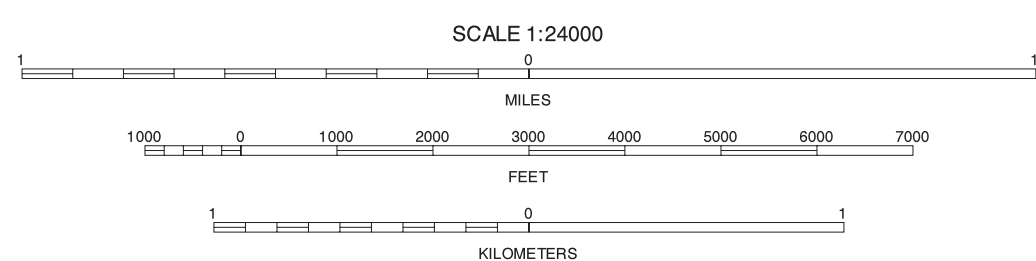
Joins sheet 8 Carlie Canyon

Joins sheet 23
Chaiyahi Rim SE

Joins sheet 24
Tall Mountain

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North American Datum of 1983(NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



6	8	6 CHAIYAH RIM NE 8 CATTLE CANYON 22 CHAIYAH RIM SE 23 OAK SPRINGS 24 TALL MOUNTAIN
22	23	

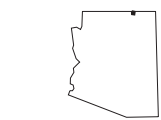
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TALL MOUNTAIN NW, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 7 OF 86

Soil map delineations extending beyond the dashed white quadrangle nealtine are for reference only and are included on adjacent map sheets.



North American Datum of 1983(NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUADRANGLE LOCATION



7		9	7 TALL MOUNTAIN NW
			9 BIG POINT
			23 OAK SPRINGS
23	24	25	24 TALL MOUNTAIN
			25 KEET SEEL RUIN

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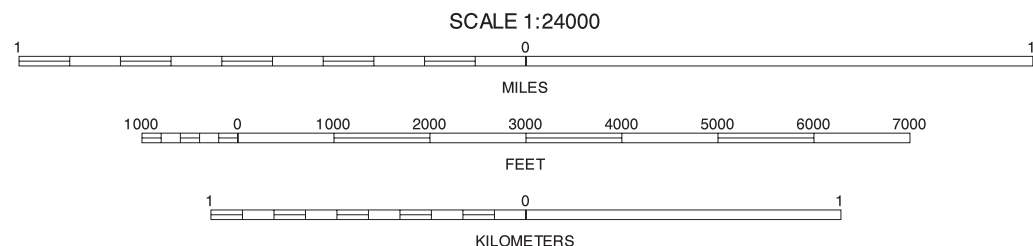
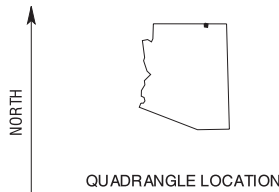
CATTLE CANYON, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 8 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



8	10	24	25	26
8 CATTLE CANYON	10 BOOT MESA	24 TALL MOUNTAIN	25 KEET SEEL RUIN	26 TSEI'N-HATSOSI
INDEX TO ADJOINING 7.5 MAPS				

BIG POINT, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 9 OF 86

Soil map delineations extending beyond the dashed white quadrangle neeline are for reference only and are included on adjacent map sheets.

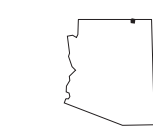


Join sheet 25
Keet Seel Ruin

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North American Datum of 1983 (NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

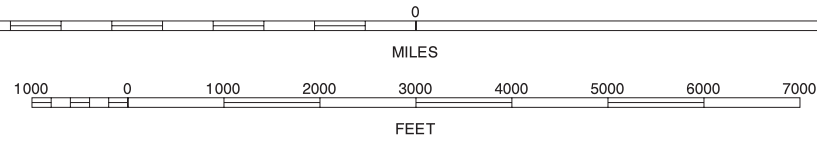
NORTH



QUADRANGLE LOCATION

Join sheet 26 Tseyi-Hatsosi

SCALE 1:24000



9	11
25	27

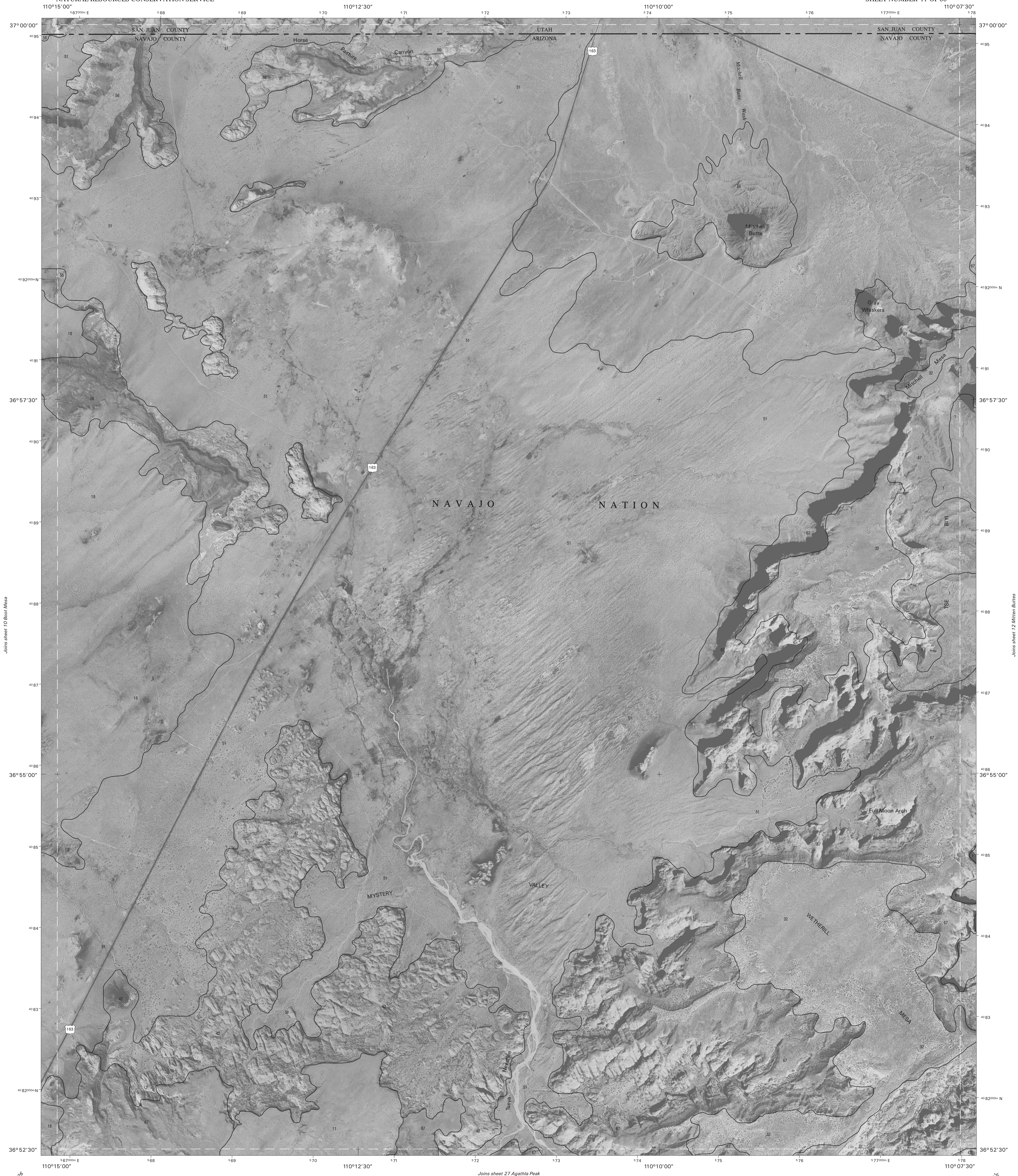
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- 9 BIG POINT
- 11 MYSTERY VALLEY
- 25 KEET SEEL RUIN
- 26 TSEYI-HATSOSI
- 27 AGATHLA PEAK

BOOT MESA, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Join sheet 27
Agathla Peak



Joins sheet 10 Boat Mesa

Joins sheet 12 Mitten Buttes

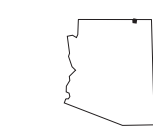
Joins sheet 26
Baby Rocks

Joins sheet 28
Baby Rocks

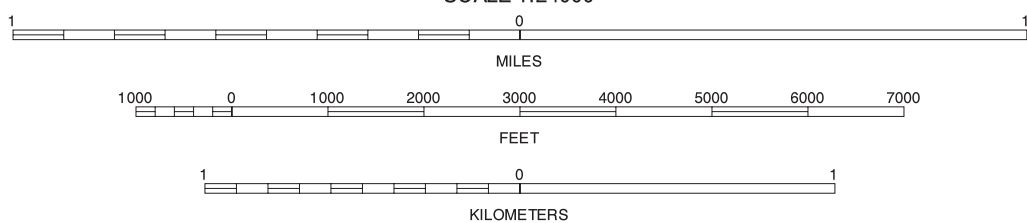
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North American Datum of 1983 (NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



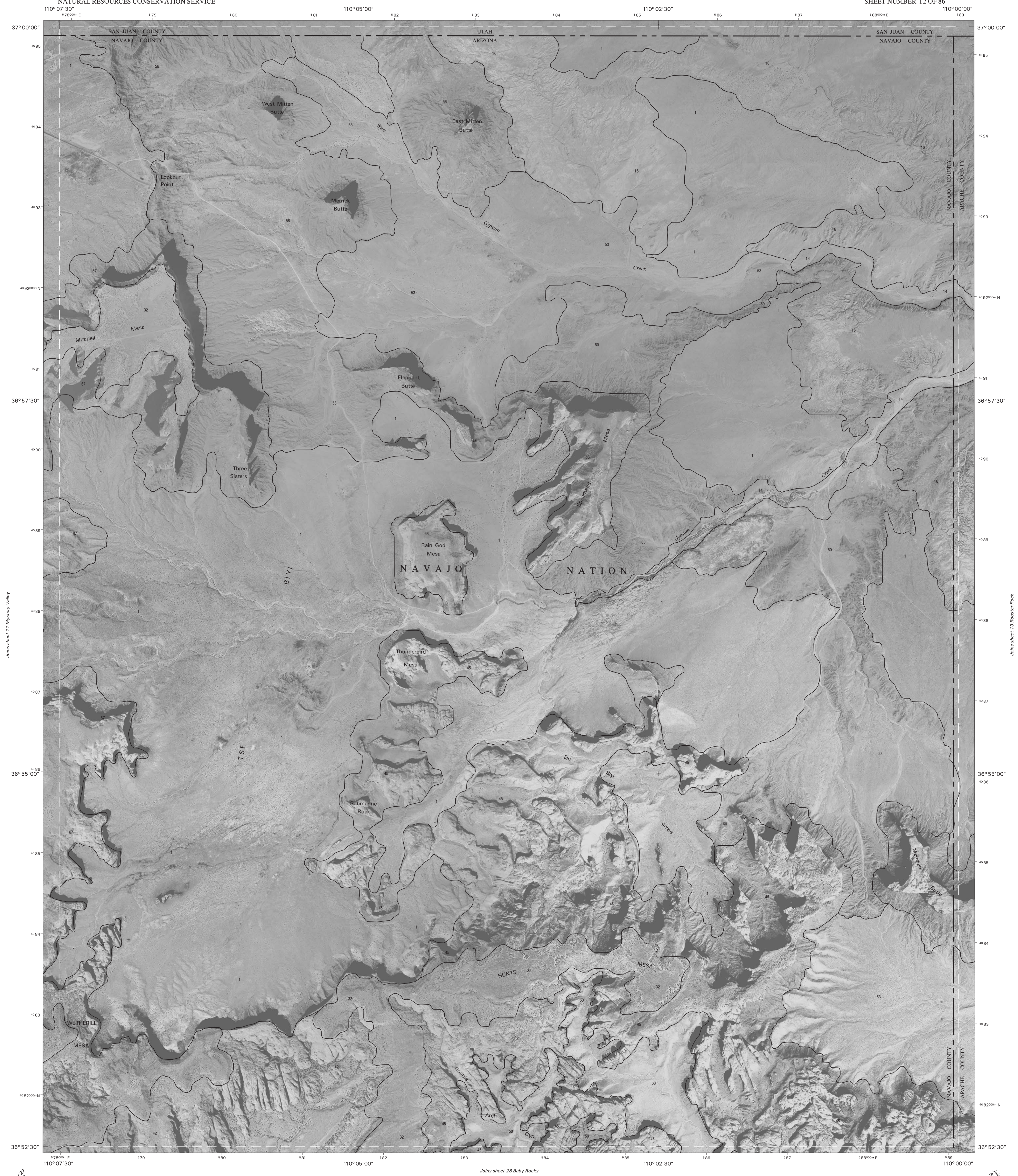
10	12
26	28

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- 10 BOAT MESA
- 12 MITTEN BUTTES
- 26 TSEYI-HATSOSI
- 27 AGATHLA PEAK
- 28 BABY ROCKS

MYSTERY VALLEY, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 11 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



Joins sheet 11 Mystery Valley

Joins sheet 13 Rooster Rock

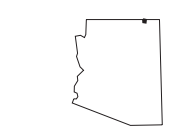
Joins sheet 27 Agatha Peak

Joins sheet 29 Red Point

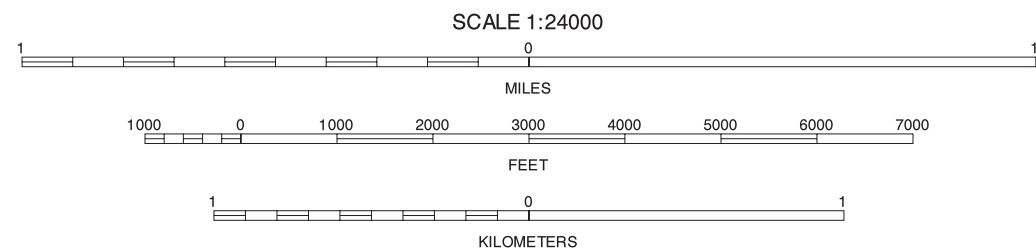
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North American Datum of 1983 (NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



11		13		
27	28	29		

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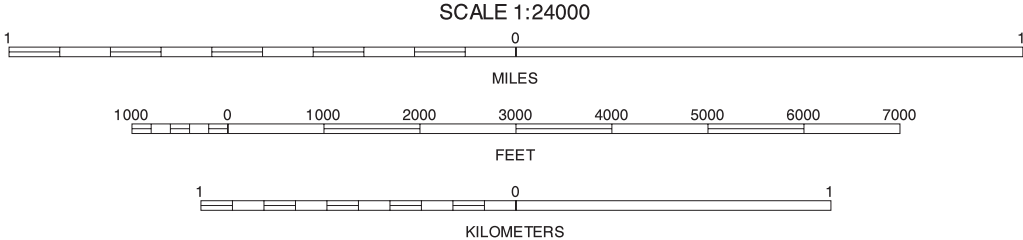
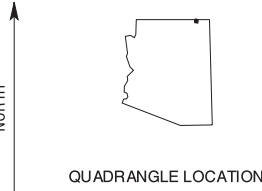
MITTEN BUTTES, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 12 OF 86

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.



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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

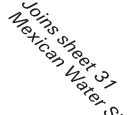


12	14	12 MITTEN BUTTES
28	29	14 GARNET RIDGE
	30	28 BABY ROCKS
		29 RED POINT
		30 DENNEHOTSO

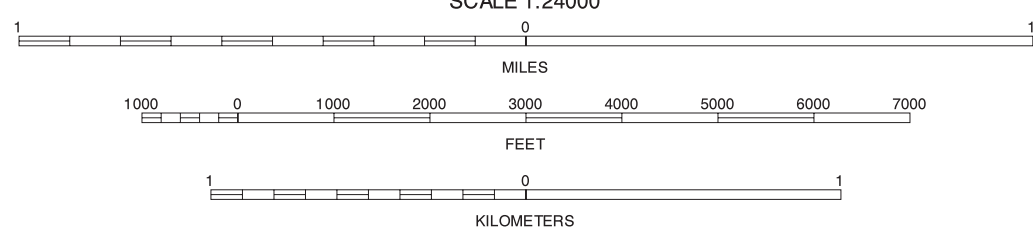
ROOSTER ROCK, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
GARNET RIDGE QUADRANGLE
SHEET NUMBER 14 OF 86



North American Datum of 1983(NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



13		15	13 ROOSTER ROCK 15 MEXICAN WATER
29	30	31	29 RED POINT 30 DENNEHOTSO 31 MEXICAN WATER SW

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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



North American Datum of 1983(NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 12.
Coordinate grid ticks and land division data, if shown, are
approximately positioned. Digital data are available for
this quadrangle.



SCALE 1:24000

The scale bars are arranged vertically. The top bar is labeled "MILES" and has a scale from 0 to 1. The middle bar is labeled "FEET" and has a scale from 0 to 7000. The bottom bar is labeled "KILOMETERS" and has a scale from 0 to 1. Each bar has a horizontal line with vertical tick marks and numerical labels.

14		
30	31	

14 GARNET RIDGE
30 DENNEHOTSO
31 MEXICAN WATER SW

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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 32
Bitter Springs



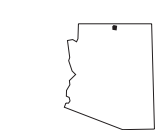
Joins sheet 17 White Dome

Joins sheet 34
Dead Horse Ridge

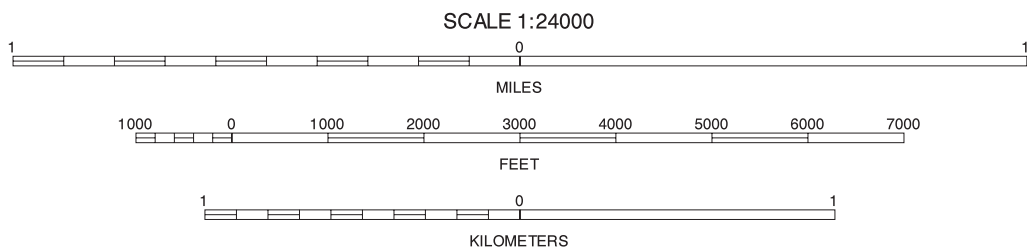
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



1	1	1
32	33	34
32	33	34

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LEES FERRY, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 16 OF 86

Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 1 Page

Joins sheet 2
Wild Horse Mesa



Joins sheet 16 Lees Ferry

Joins sheet 18 Lache-e Rock

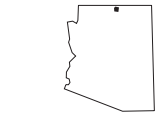
Joins sheet 23
Explosive Rock

Joins sheet 35
Many Ghosts Hill

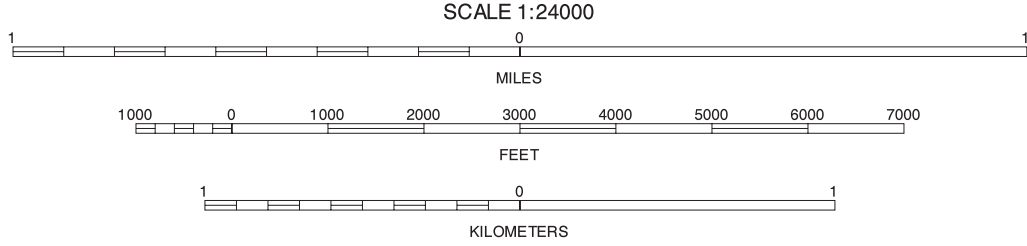
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NORTH



QUADRANGLE LOCATION



1	2	3
16	17	18
33	34	35

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WHITE DOME, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 17 OF 86

Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 1
Page

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
LECHE-E ROCK QUADRANGLE
SHEET NUMBER 18 OF 86

Joins sheet 3
Page Canyon



Joins sheet 17 White Dome

Joins sheet 19 Cedar Tree Bench

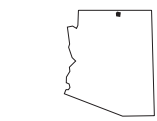
Joins sheet 34
Dead Horse Ridge

Joins sheet 36
Horseshoe Mesa

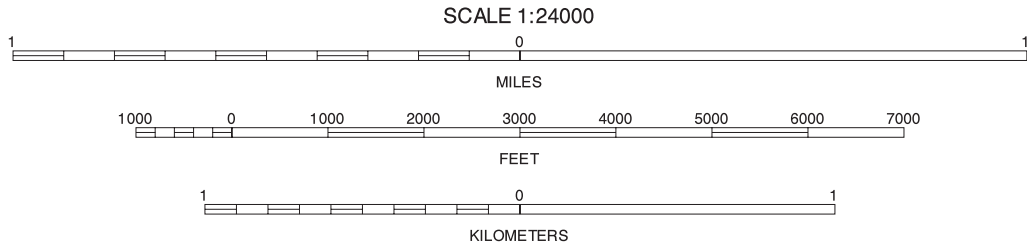
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NORTH



QUADRANGLE LOCATION



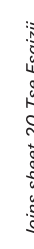
1	2	3	1	PAGE
			2	WILD HORSE MESA
			3	FACE CANYON
17		19	17	WHITE DOME
			19	CEDAR TREE BENCH
34	35	36	34	DEAD MONKEY RIDGE
			35	MANY GHOSTS HILL
			36	HORSETHIEF MESA

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LECHE-E ROCK, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 18 OF 86

Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

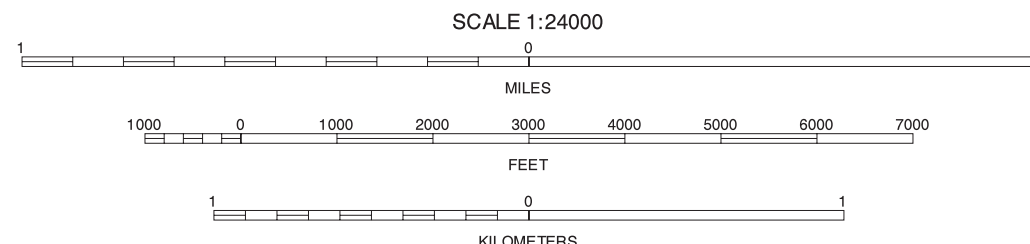
111°15'00" 47R000m E 47R 48R 111°12'30" Joins sheet 3 Face Canyon 111°10'00" 48R000m E 48R 47R 111°07'30" 48R000m E 48R



North American Datum of 1983(NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUADRANGLE LOCATION



2	3	4	2	WILD HORSE MESA
			3	FACE CANYON
18		20	4	WEST CANYON CRE
			18	LECHE-E ROCK
			20	TSE ESGIZI
			35	MANY GHOSTS HILL
35	36	37	36	HORSETHIEF MESA
			37	WHITE HILL

INDEX TO ADJOINING 7.5 MAPS

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 3
Face Canyon

Joins sheet 5
Chaiyahi Flat

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
TSE ESGIZII QUADRANGLE
SHEET NUMBER 20 OF 86

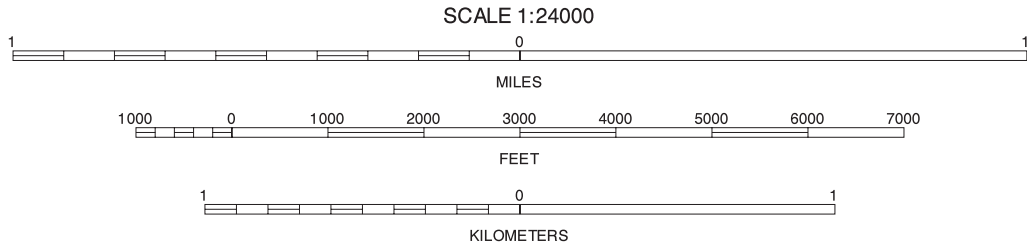
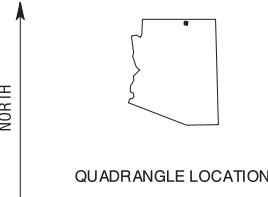


Joins sheet 26
Horseshoe Mesa

Joins sheet 28
Two Red Mesas

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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



3	4	5
19	20	21
36	37	38

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TSE ESGIZII, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 20 OF 86

Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 4
West Canyon Creek

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
CHAIYAHÍ RIM SW QUADRANGLE
SHEET NUMBER 21 OF 86

Joins sheet 6
Chaiyahi Rim NE



Joins sheet 20 Tse Egizii

Joins sheet 22 Chaiyahi Rim SE

Joins sheet 27
White Hill

Joins sheet 29
Inscription House Ruin

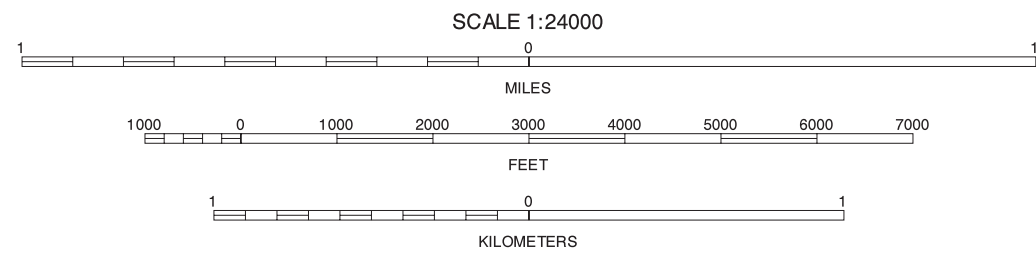
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



4	5	6
20	22	
37	38	39

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- 4 WEST CANYON CREEK
- 5 CHAIYAHÍ FLAT
- 6 CHAIYAHÍ RIM NE
- 20 TSE ESGIZII
- 22 CHAIYAHÍ RIM SE
- 37 WHITE HILL
- 38 TWO RED MESAS
- 39 INSCRIPTION HOUSE RUIN

CHAIYAHÍ RIM SW, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 21 OF 86

Soil map delineations extending beyond the dashed white quadrangle nealines are for reference only and are included on adjacent map sheets.

Joins sheet 5
Chaiyahi Flat

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
CHAIYAH RIM SE QUADRANGLE
SHEET NUMBER 22 OF 86

Joins sheet 7
Tall Mountain NW

Joins sheet 21
Chaiyahi Rim SW

Joins sheet 23
Oak Springs

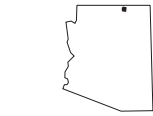
Joins sheet 39
Two Red Mesas

Joins sheet 40
Shonto NW

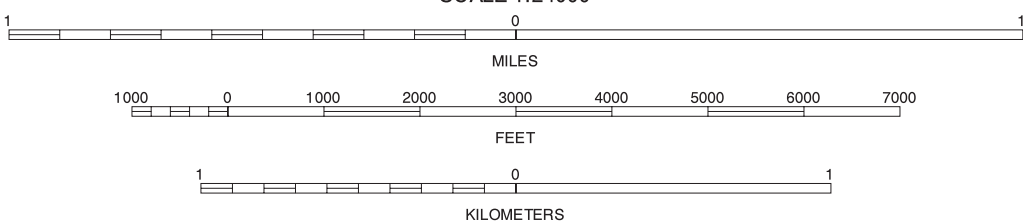
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



5	6	7
21	22	23
38	39	40

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CHAIYAH RIM SE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 22 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 6
Chaiyahi Rim NE

Joins sheet 8
Cattle Canyon

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
OAK SPRINGS QUADRANGLE
SHEET NUMBER 23 OF 86

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

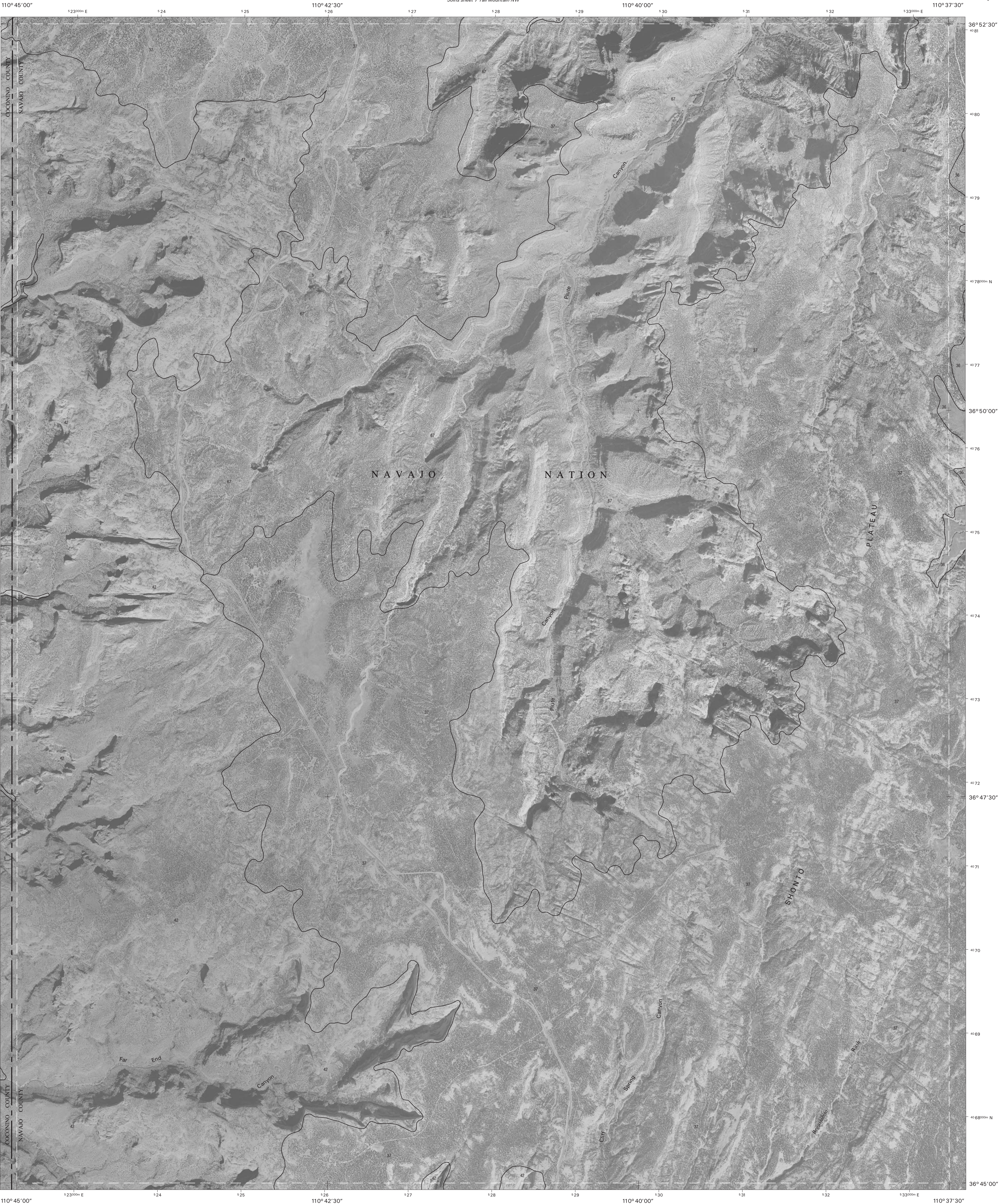
Joins sheet 7 Tall Mountain NW

Joins sheet 40 Shonto NW

Joins sheet 41
Beteatakin Ruin

Joins sheet 22 Chaiyahi Rim SE

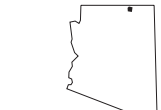
Joins sheet 24 Tall Mountain



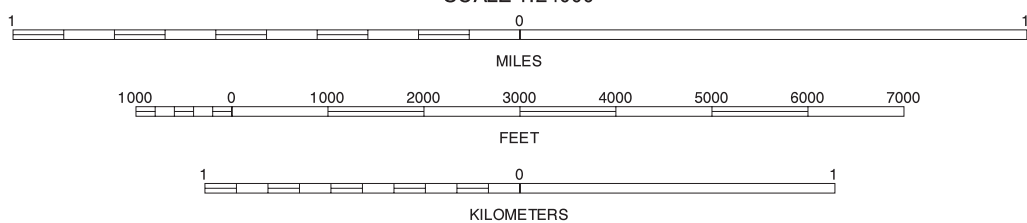
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NORTH



QUADRANGLE LOCATION



6	7	8	6 CHAIYAH RIM NE 7 TALL MOUNTAIN NW 8 CATTLE CANYON
22		24	22 CHAIYAH RIM SE 24 TALL MOUNTAIN 39 INSCRIPTION HOUSE RUIN
39	40	41	40 SHONTO NW 41 BETATAKIN RUIN

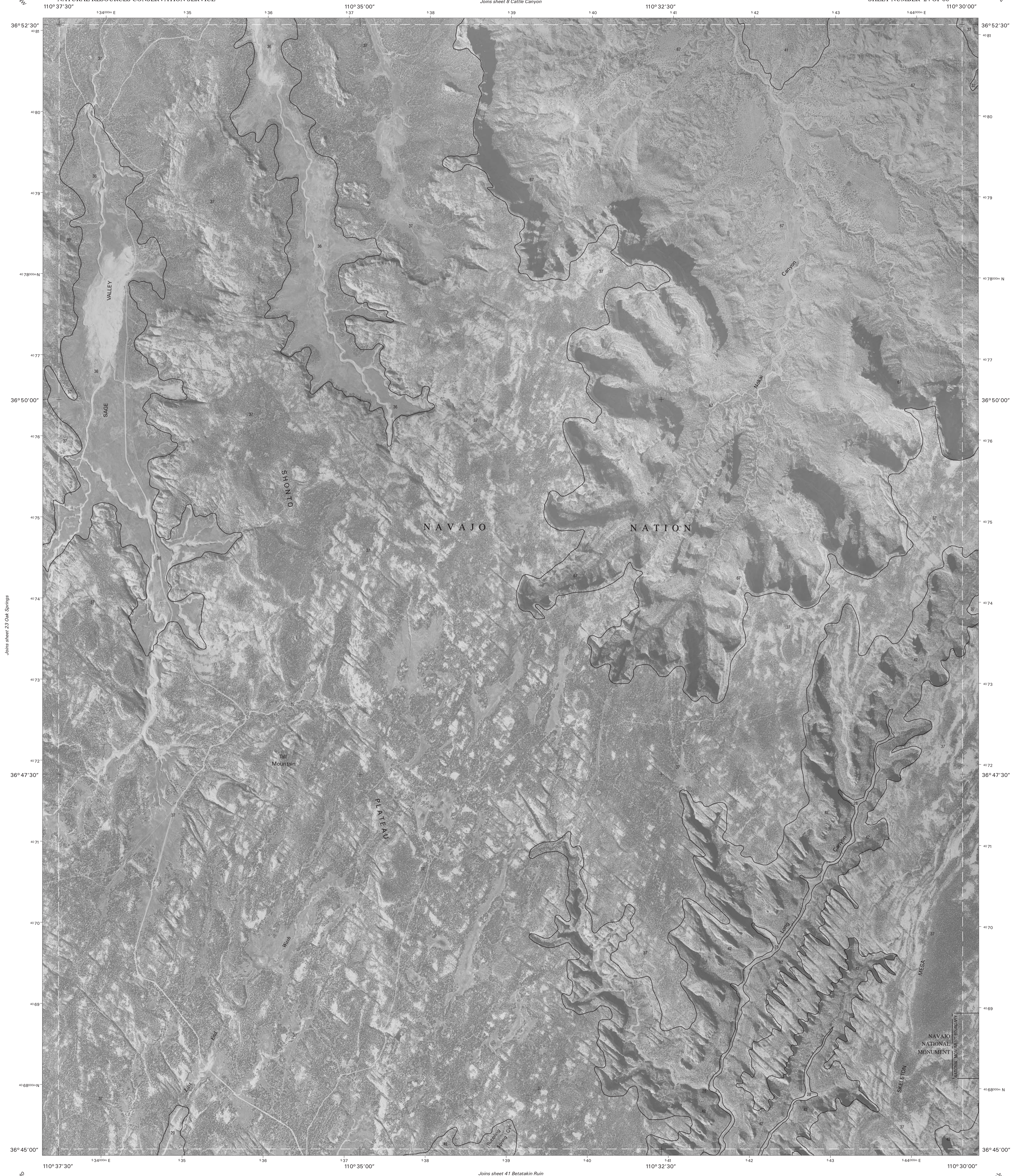
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OAK SPRINGS, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 23 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

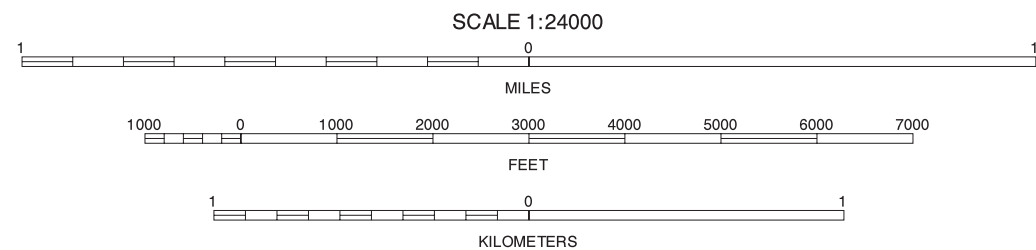
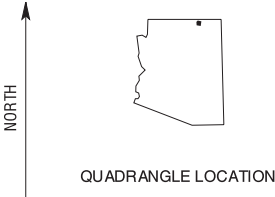
Joins sheet 7
Tall Mountain NW

Joins sheet 9
Big Point



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7	8	9	7 TALL MOUNTAIN NW
			8 CATTLE CANYON
			9 BIG POINT
23		25	23 OAK SPRINGS
			25 KEET SEEL RUIN
			40 SHONTO NW
40	41	42	41 BETATAKIN RUIN
			42 MARSH PASS

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TALL MOUNTAIN, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 24 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 42
Wetland Pass

Joins sheet 9
Cattle Canyon

Joins sheet 10
Boon Mesa

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

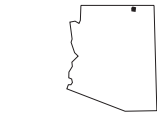
NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
KEET SEEL RUIN QUADRANGLE
SHEET NUMBER 25 OF 86



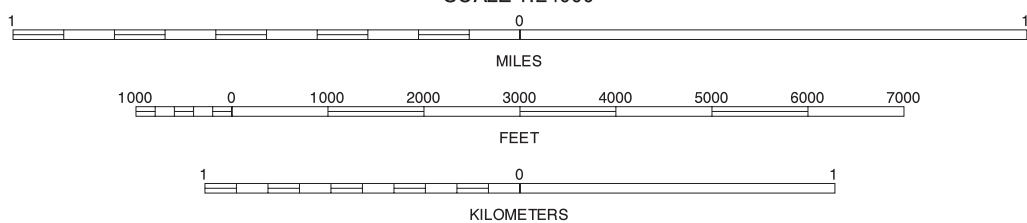
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NORTH



QUADRANGLE LOCATION



8	9	10	8 CATTLE CANYON
			9 BIG POINT
			10 BOOT MESA
24		26	24 TALL MOUNTAIN
			26 TSEYI-HATSOI
			41 BETATAKIN RUIN
41	42	43	42 MARSH PASS
			43 KAYENTA WEST

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KEET SEEL RUIN, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 25 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 41
Bataatkin Ruin

Joins sheet 43
Kayenta West

Joins sheet 9
Big Point

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
TSEYI-HATSOSI QUADRANGLE
SHEET NUMBER 26 OF 86

Joins sheet 11
Mystery Valley

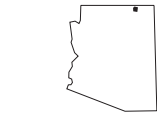


Joins sheet 42
Marsh Pass

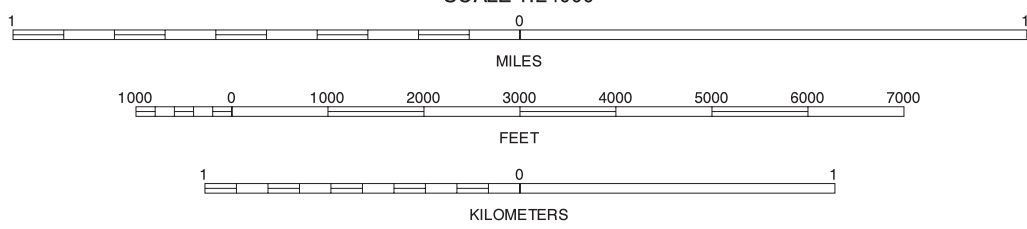
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



9	10	11	9 BIG POINT
			10 BOOT MESA
			11 MYSTERY VALLEY
25		27	25 KEET SEEL RUIN
			27 AGATHLA PEAK
			42 MARSH PASS
42	43	44	43 KAYENTA WEST
			44 KAYENTA EAST

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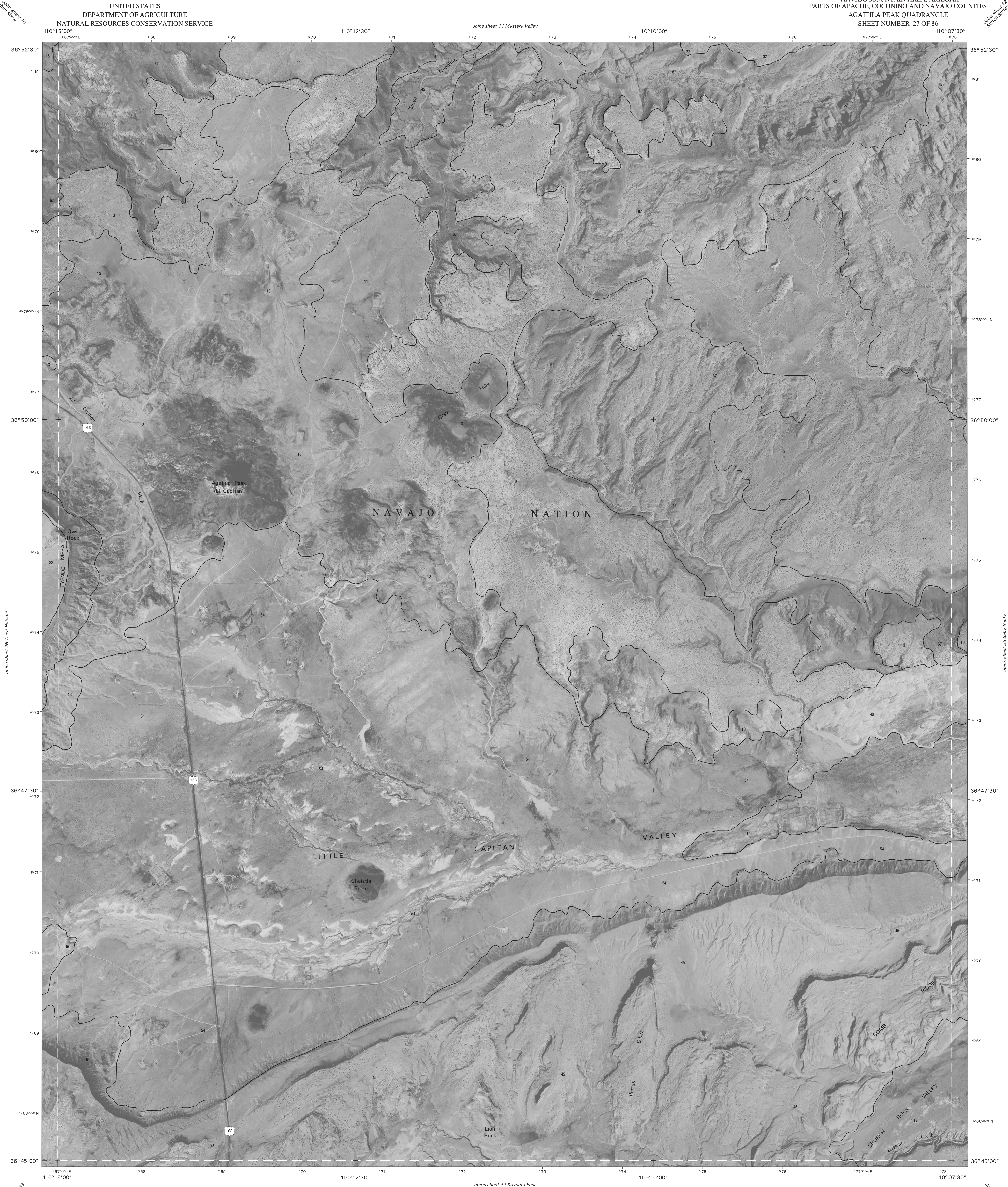
TSEYI-HATSOSI, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 26 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 44
Kayenta East

Joins sheet 10
Boot Mesa

Joins sheet 12
Mitten Buttes



Joins sheet 43
Kayenta West

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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks; Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

10	11	12	10 BOOT MESA
			11 MYSTERY VALLEY
			12 MITTEN BUTTES
26		28	26 TSEY-HATSOSI
			28 BABY ROCKS
			43 KAYENTA WEST
43	44	45	44 KAYENTA EAST
			45 CHURCH ROCK

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AGATHLA PEAK, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 27 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 45
Church Rock

Joins sheet 11
Mystery Valley

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
BABY ROCKS QUADRANGLE
SHEET NUMBER 28 OF 86

Joins sheet 13
Rooster Rock



Joins sheet 27
Agathla Peak

Joins sheet 29
Red Point

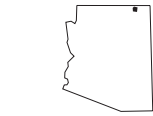
Joins sheet 44
Kayenta East

Joins sheet 46
Red Point West

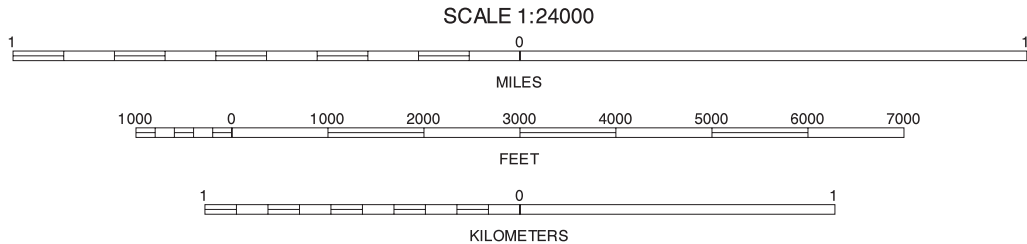
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



11	12	13
27	28	29
44	45	46

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BABY ROCKS, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 28 OF 86

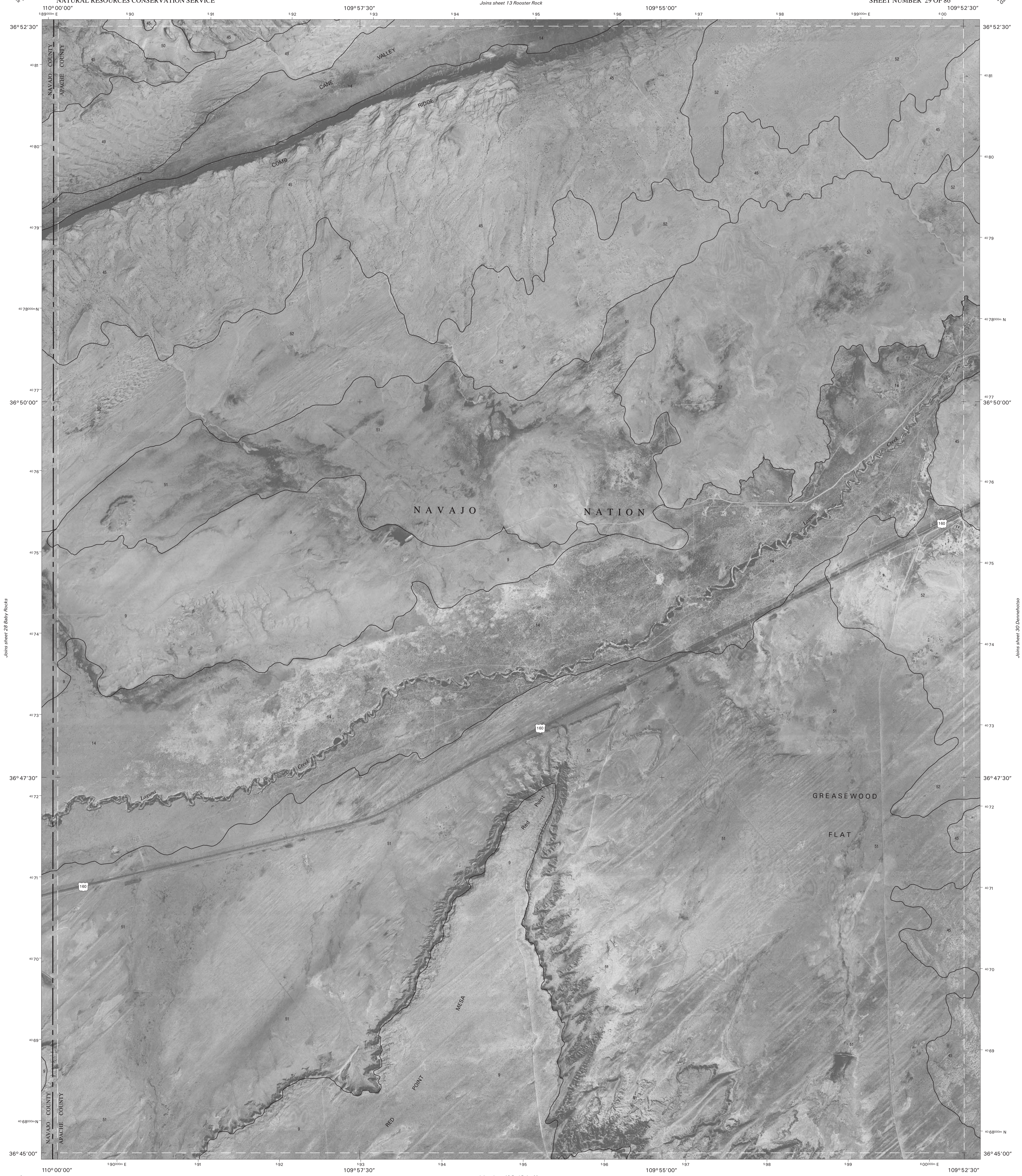
Soil map delineations extending beyond the dashed white quadrangle nealtine are for reference only and are included on adjacent map sheets.

Joins sheet 12
White Butte

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
RED POINT QUADRANGLE
SHEET NUMBER 29 OF 86

Joins sheet 14
Garret Ridge



Joins sheet 46
Church Rock

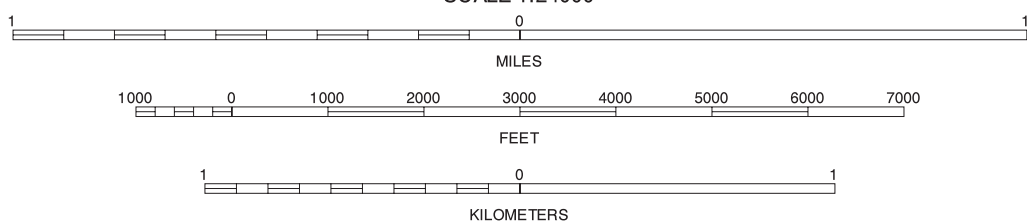
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NORTH



QUADRANGLE LOCATION



12	13	14
28	29	30
45	46	47

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- 12 MITTEN BUTTES
- 13 ROOSTER ROCK
- 14 GARNET RIDGE
- 28 BABY ROCKS
- 30 DENNEHOTSO
- 45 CHURCH ROCK
- 46 RED POINT MESA
- 47 TALL MESA

RED POINT, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 29 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 47
Tall Mesa

Joins sheet 13
Rooster Rock

Joins sheet 16
Mexican Water

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
DENNEHOTSO QUADRANGLE
SHEET NUMBER 30 OF 86

UNITED STATES
DEPARTMENT OF AGRICULTURE
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Joins sheet 29 Red Point

Joins sheet 31 Mexican Water SW

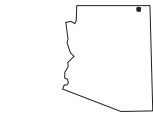
Joins sheet 46
Red Point Mesa

Joins sheet 48
Red Point

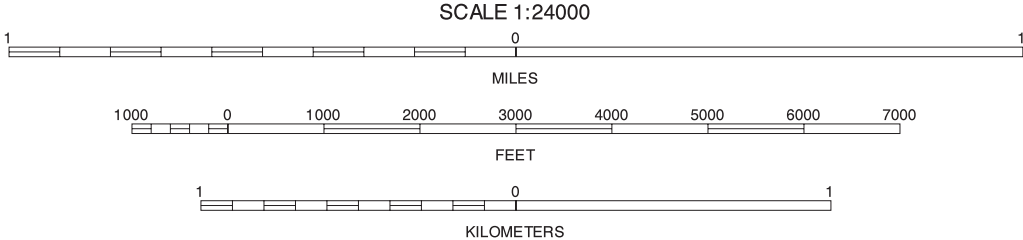
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NORTH



QUADRANGLE LOCATION



13	14	15
29	30	31
46	47	48

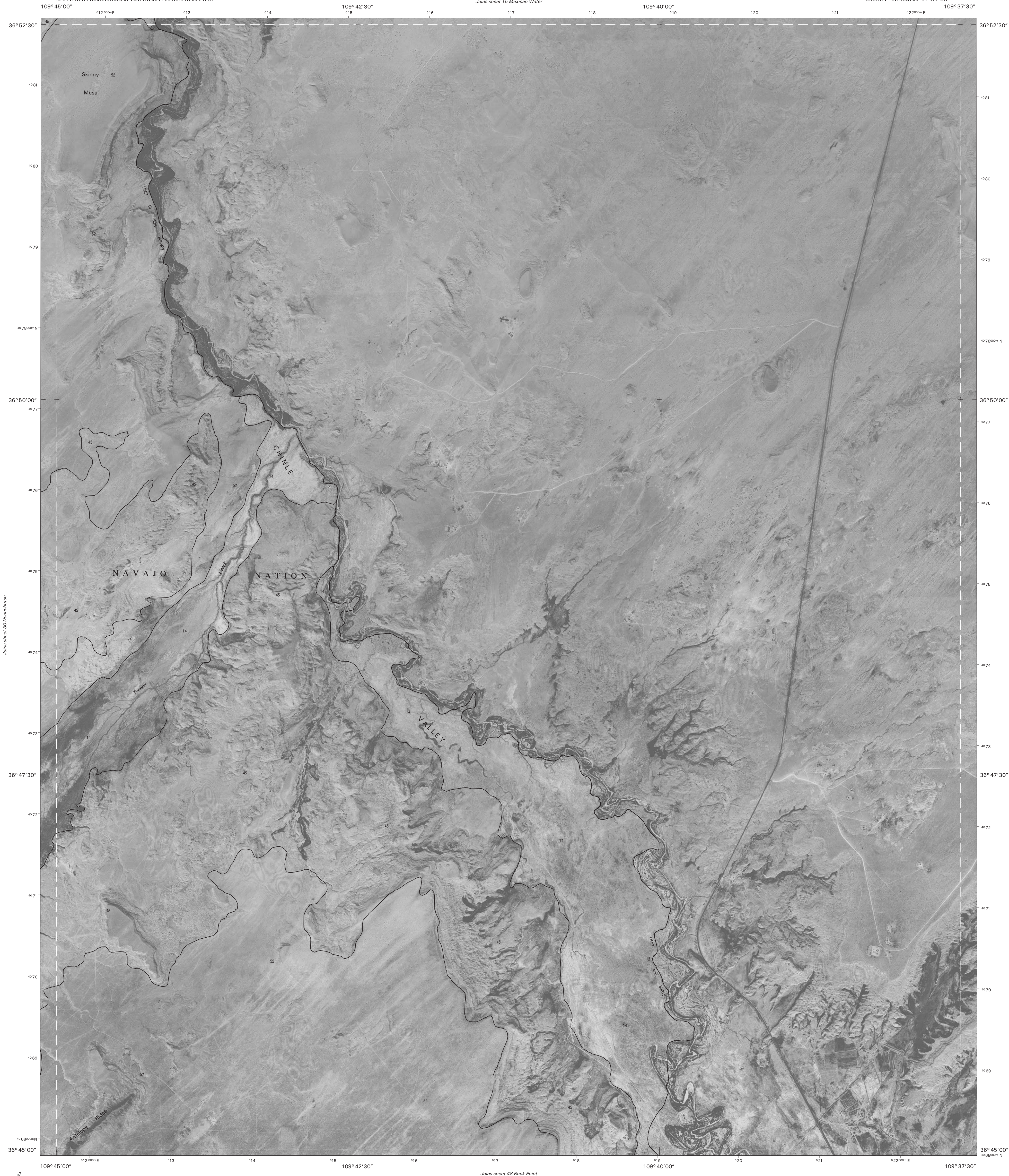
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- 13 ROOSTER ROCK
- 14 GARNET RIDGE
- 15 MEXICAN WATER
- 29 RED POINT
- 31 MEXICAN WATER SW
- 46 RED POINT MESA
- 47 TALL MESA
- 48 ROCK POINT

DENNEHOTSO, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 30 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatlne are for reference only and are included on adjoining map sheets.

Joins sheet 14
Garnet Ridge



Joins sheet 30 Dinehaoszo

Joins sheet 47
Tall Mesa

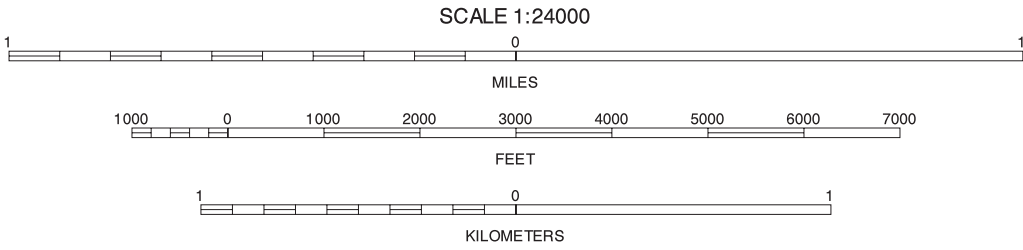
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NORTH



QUADRANGLE LOCATION



14	15	14 GARNET RIDGE
30		15 MEXICAN WATER
47	48	30 DENNEHOTSO
		47 TALL MESA
		48 ROCK POINT

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MEXICAN WATER SW, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 31 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



North American Datum of 1983(NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 12.
Coordinate grid ticks and land division data, if shown, are
approximately positioned. Digital data are available for
this quadrangle.



		16	
		33	16 LEES FERRY
		50	33 EXPLOSIVE ROCK
	49		49 TANNER WELL
			50 CEDAR TREE HILLS

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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



Joins sheet 32 Bitter Springs

Joins sheet 34 Dead Monkey Ridge

Joins sheet 49
Tanner Hill

Joins sheet 51
Dove Spring

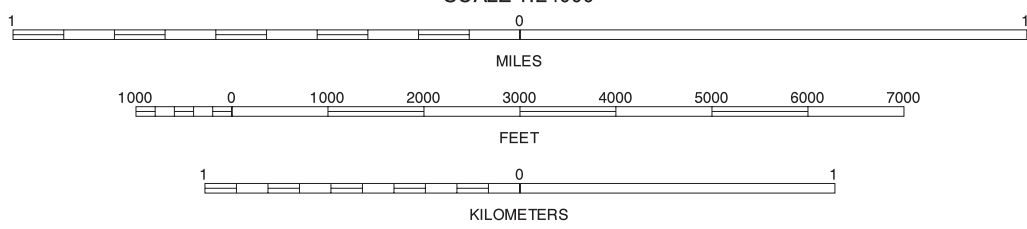
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NORTH



QUADRANGLE LOCATION



	16	17
32		34
49	50	51

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EXPLOSIVE ROCK, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 33 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatine are for reference only and are included on adjacent map sheets.

Joins sheet 16
Lees Ferry

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
DEAD MONKEY RIDGE QUADRANGLE
SHEET NUMBER 34 OF 86

Joins sheet 18
Leche-E Rock

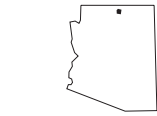


Joins sheet 50
Cedar Tree Hills

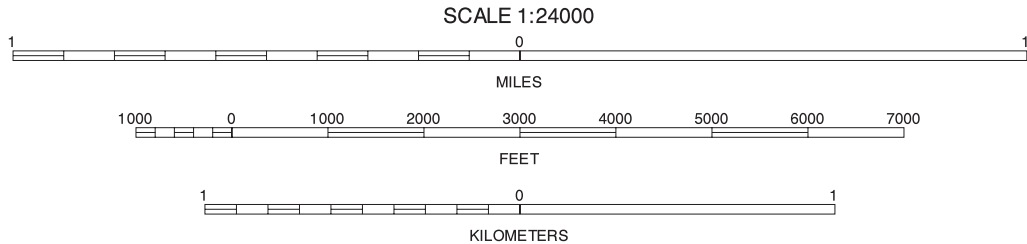
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



16	17	18
33	34	35
50	51	52

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16	LEES FERRY
17	WHITE DOME
18	LECHE-E ROCK
33	EXPLOSIVE ROCK
35	MANY GHOSTS HILL
50	CEDAR TREE HILLS
51	DOVE SPRING
52	DOVE SPRING SE

DEAD MONKEY RIDGE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 34 OF 86

Soil map delineations extending beyond the dashed white quadrangle heatine are for reference only and are included on adjacent map sheets.

Joins sheet 52
Dove Spring SE

Joins sheet 17
White Dome

Joins sheet 19
Cedar Tree Bench



Joins sheet 34 Dead Monkey Ridge

Joins sheet 36 Horseshoe Mesa

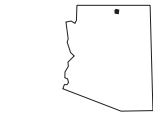
Joins sheet 51
Dove Spring

Joins sheet 53
Arrowhead Mesa

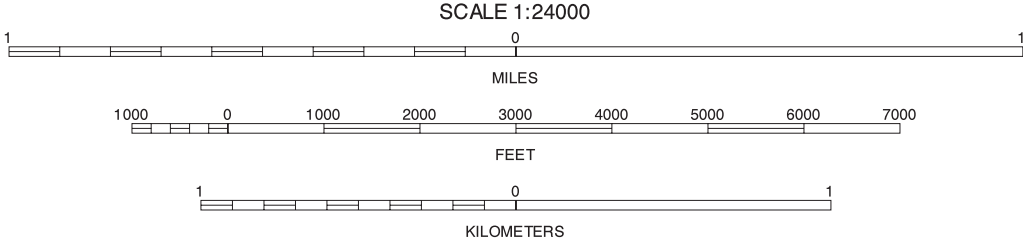
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NORTH



QUADRANGLE LOCATION



17	18	19
34		36
51	52	53

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MANY GHOSTS HILL, ARIZONA
7.5 MINUTE SERIES
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Soil map delineations extending beyond the dashed white quadrangle neatine are for reference only and are included on adjacent map sheets.

Joins sheet 19
Leche-e Rock

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
HORSETHIEF MESA QUADRANGLE
SHEET NUMBER 36 OF 86

Joins sheet 20
Tse Esigizi



Joins sheet 35
Many Ghosts Hill

Joins sheet 37
White Hill

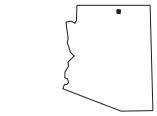
Joins sheet 52
Dove Spring SE

Joins sheet 54
Kahito

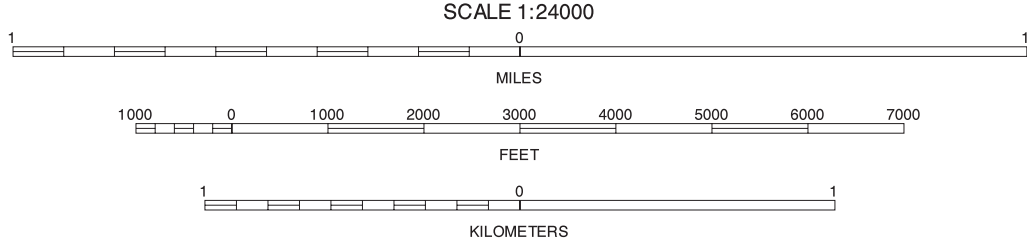
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



18	19	20
35	36	37
52	53	54

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HORSETHIEF MESA, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 36 OF 86

Soil map delineations extending beyond the dashed white quadrangle heatine are for reference only and are included on adjacent map sheets.

Joins sheet 19
Cedar Tree Bench

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
WHITE HILL QUADRANGLE
SHEET NUMBER 37 OF 86

Joins sheet 21
Chaiyah Rim SW



Joins sheet 36 Horseshoe Mesa

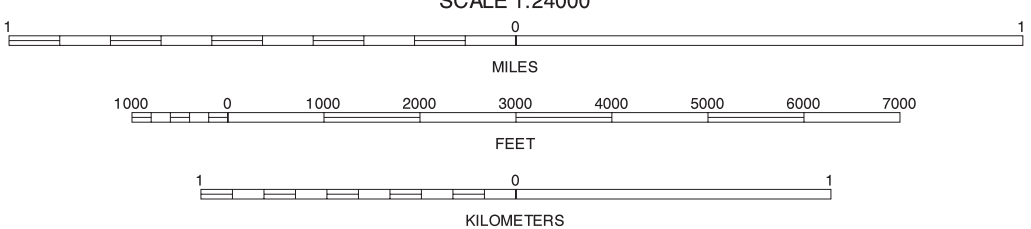
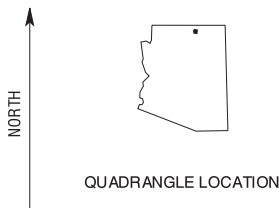
Joins sheet 38 Two Red Mesas

Joins sheet 53
Arrowhead Mesa

Joins sheet 55
Square Butte

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19	20	21
36	37	38
53	54	55

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WHITE HILL, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 37 OF 86

Soil map delineations extending beyond the dashed white quadrangle heatine are for reference only and are included on adjacent map sheets.

Joins sheet 20
Lee Anglin

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
TWO RED MESAS QUADRANGLE
SHEET NUMBER 38 OF 86

Joins sheet 22
Chaiyahi Rim SW

Joins sheet 21 Chaiyahi Rim SW

Joins sheet 37 White Hill

Joins sheet 39 Inscription House Ruin

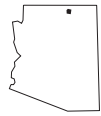
Joins sheet 54
Kaibito

Joins sheet 56
Whirlwind Rock

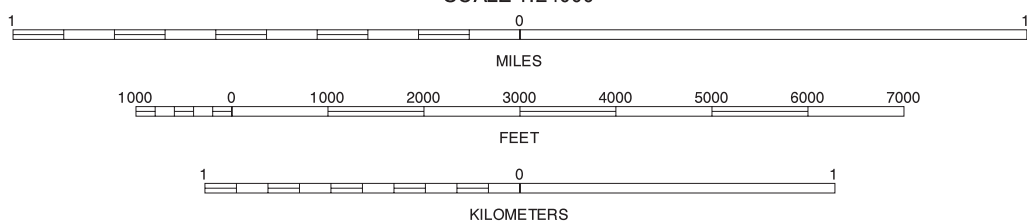
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



20	21	22	20 TSE ESGIZI
			21 CHAIYAH RIM SW
			22 CHAIYAH RIM SE
37		39	37 WHITE HILL
			39 INSCRIPTION HOUSE RUIN
			54 KABIITO
54	55	56	55 SQUARE BUTTE
			56 WHIRLWIND ROCK

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TWO RED MESAS, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 38 OF 86

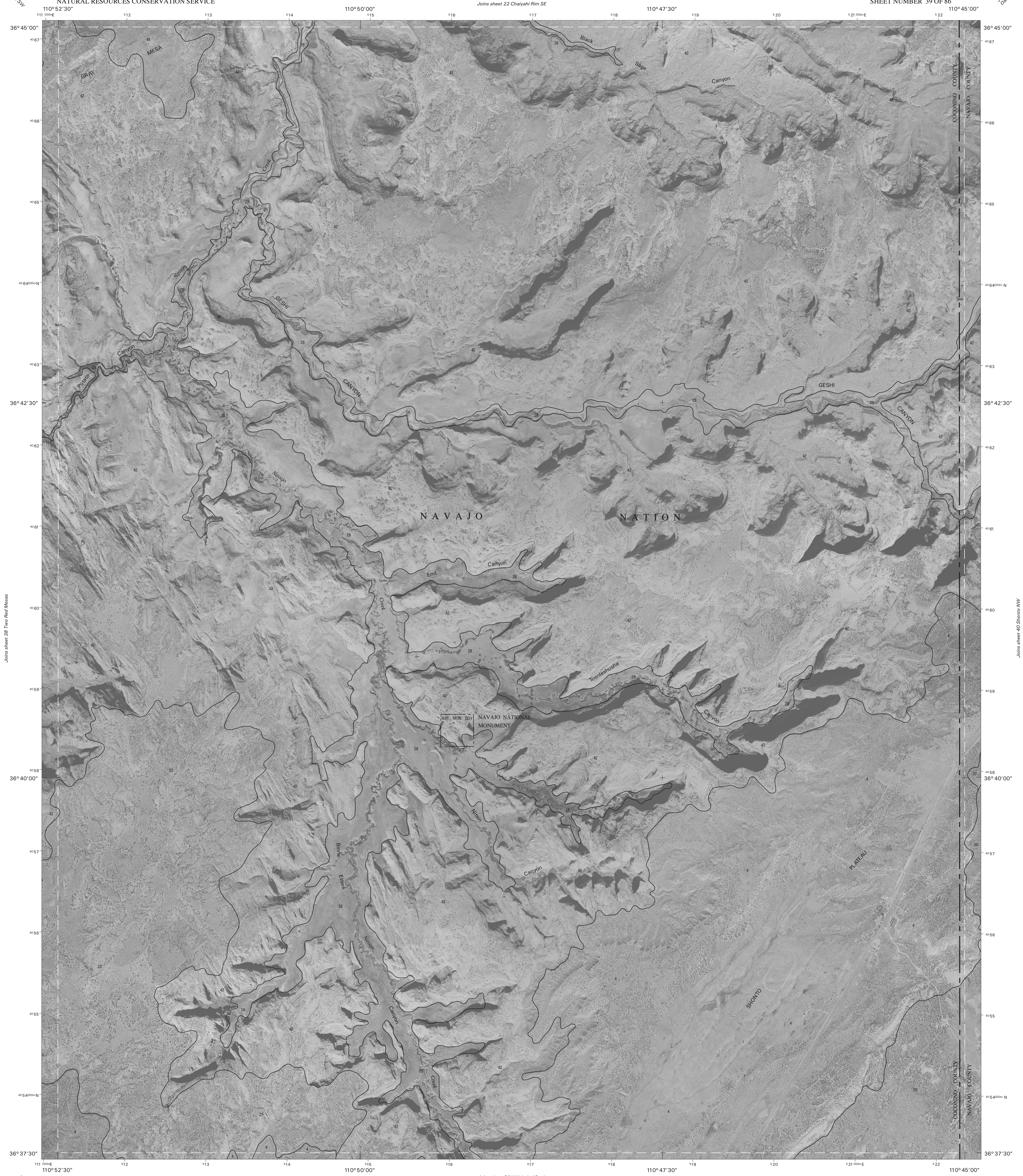
Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 21
Chaiyahi Rim SW

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NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
INSCRIPTION HOUSE RUIN QUADRANGLE
SHEET NUMBER 39 OF 86

Joins sheet 23
Oak Springs



Joins sheet 38 Two Red Mesas

Joins sheet 40 Shonto NW

Joins sheet 56
Square Butte

Joins sheet 57
Shonto

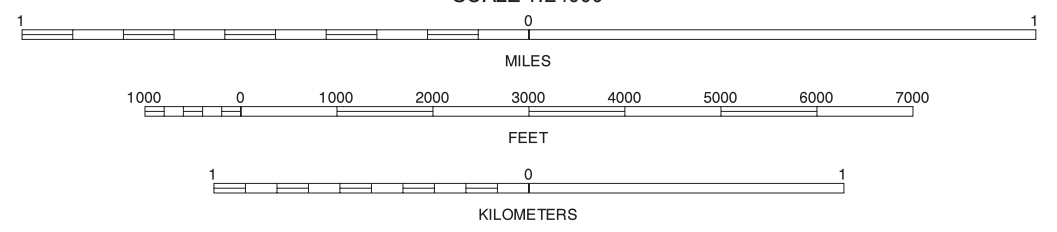
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NORTH



QUADRANGLE LOCATION



21	22	23
38	39	40
55	56	57

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INSCRIPTION HOUSE RUIN, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 39 OF 86

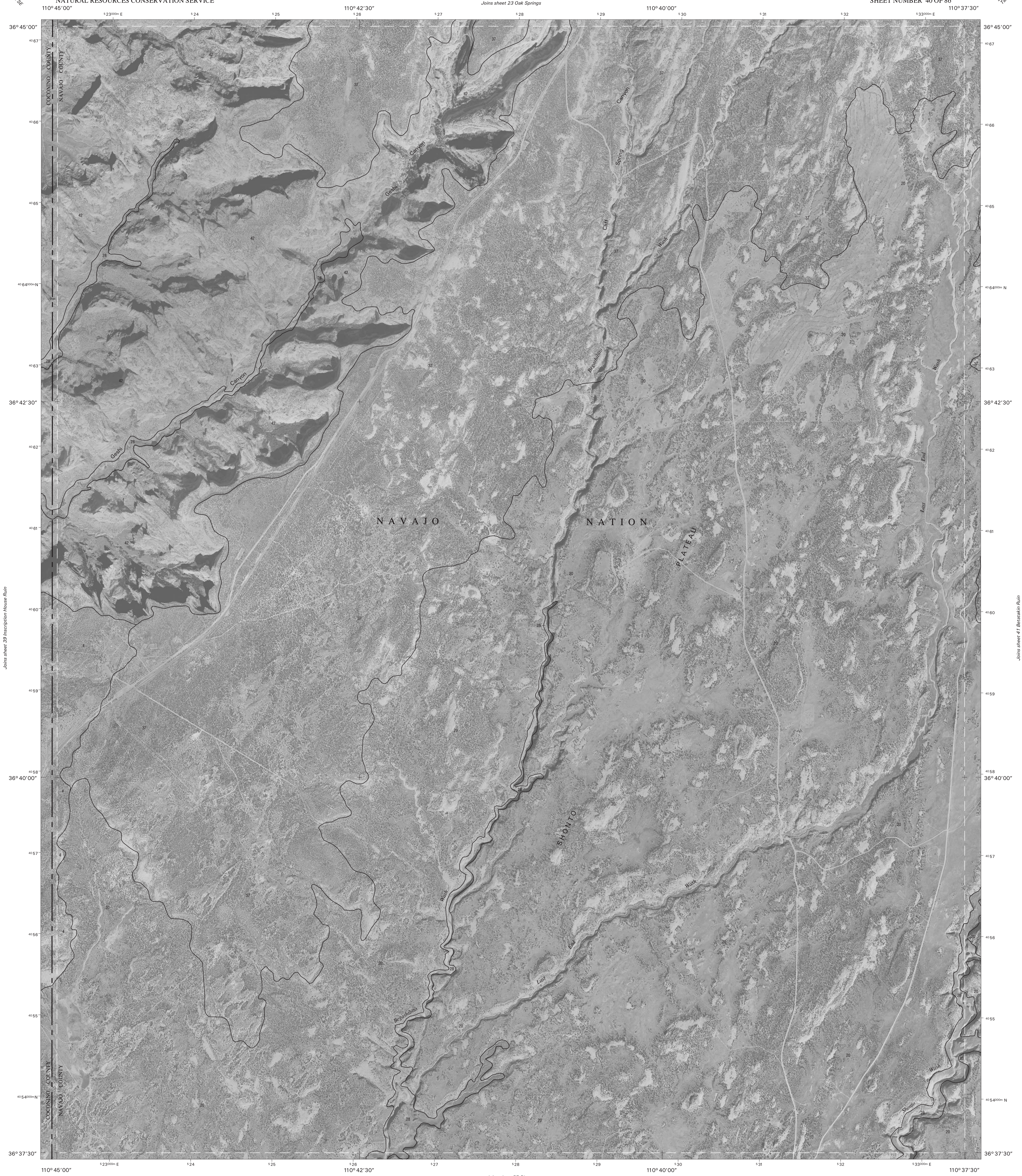
Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 22
Chaiyah Rim SE

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
SHONTO NW QUADRANGLE
SHEET NUMBER 40 OF 86

Joins sheet 24
all mountain



Joins sheet 39
Inscription House Ruin

Joins sheet 41
Beretakin Ruin

Joins sheet 56
Whirlwind Rock

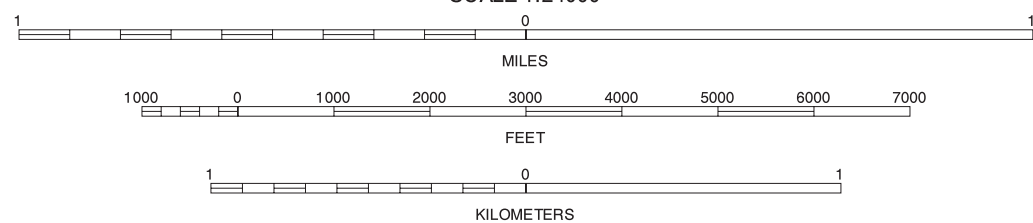
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NORTH



QUADRANGLE LOCATION



Joins sheet 57
Shonto

22	23	24
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SHONTO NW, ARIZONA
7.5 MINUTE SERIES
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Joins sheet 58
Shonto SE

Joins sheet 23
Oak Springs

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NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
BETATAKIN RUIN QUADRANGLE
SHEET NUMBER 41 OF 86

Joins sheet 25
Keet Seel Ruin

Joins sheet 40 Shonto NW

Joins sheet 42 Marsh Pass

Joins sheet 57
Shonto

Joins sheet 59
Long House Valley

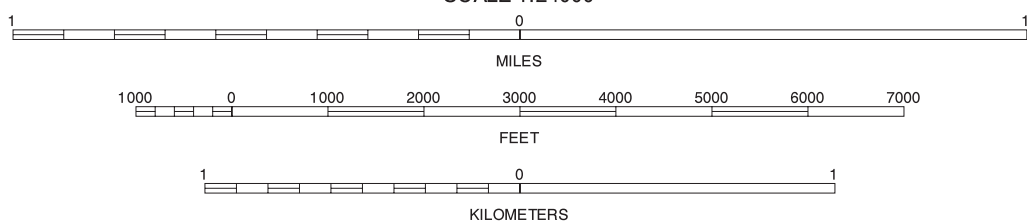
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



23	24	25	23 OAK SPRINGS
			24 TALL MOUNTAIN
			25 KEET SEEL RUIN
40		42	40 SHONTO NW
			42 MARSH PASS
			57 SHONTO
57	58	59	58 SHONTO SE
			59 LONG HOUSE VALLEY

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BETATAKIN RUIN, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 41 OF 86

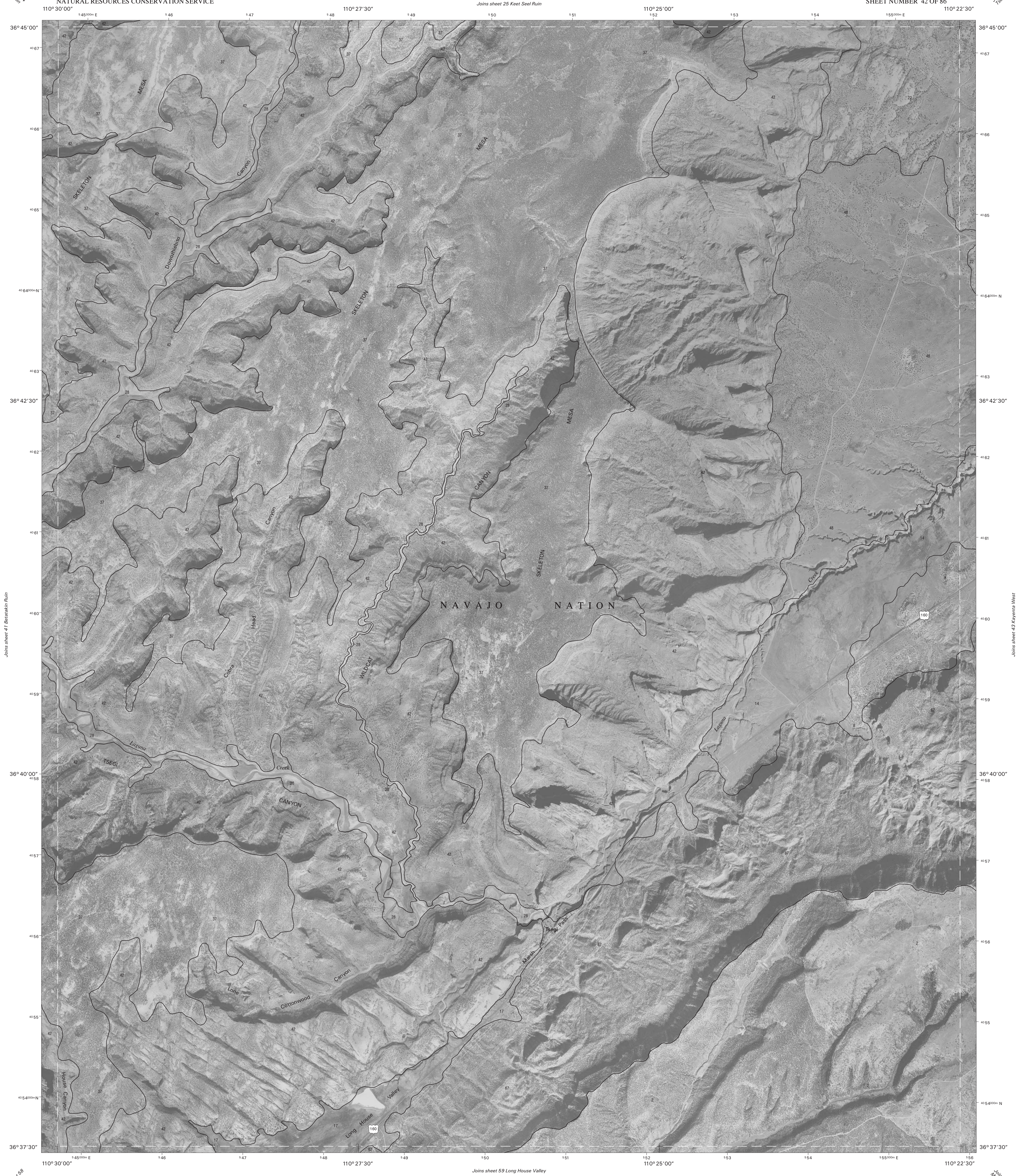
Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 24
Tall Mountain

Joins sheet 26
Marsh Pass

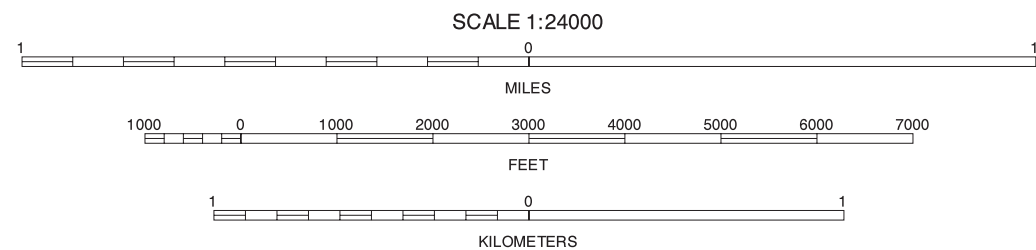
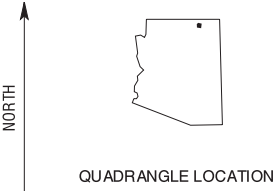
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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
MARSH PASS QUADRANGLE
SHEET NUMBER 42 OF 86



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24	25	26
41	42	43
58	59	60

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MARSH PASS, ARIZONA
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SHEET NUMBER 42 OF 86

Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 58
Shono 58

Joins sheet 62
Marsh Pass SE

Joins sheet 25
Keep House Run

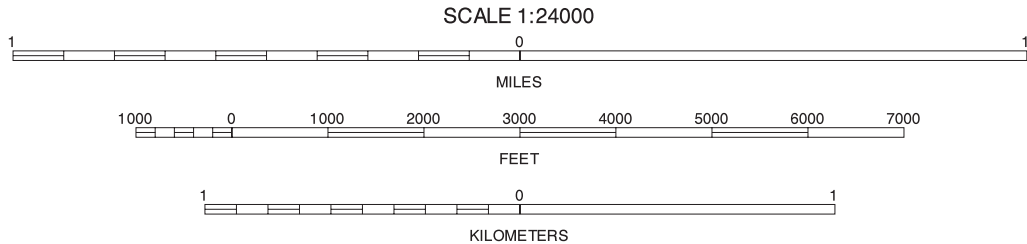
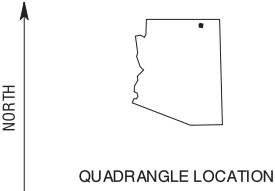
Joins sheet 27
Kagalla Peak



Joins sheet 59
Long House Valley

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25	26	27	28
42	43	44	45
59	60	61	62

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KAYENTA WEST, ARIZONA
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SHEET NUMBER 43 OF 86

Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 67
Owl Spring

Joins sheet 26
Tseyi Hatsosi

Joins sheet 28
Baby Rocks



Joins sheet 60
Marsh Pass SE

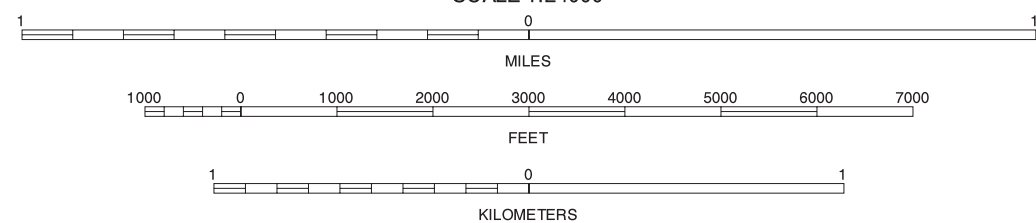
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks; Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



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43		45
60	61	62

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27 AGATHLA PEAK
28 BABY ROCKS
43 KAYENTA WEST
45 CHURCH ROCK
60 MARSH PASS SE
61 OWL SPRING
62 CHILCHINBITO

KAYENTA EAST, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 62
Chilchinito

Joins sheet 27
Agathla Peak

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
CHURCH ROCK QUADRANGLE
SHEET NUMBER 45 OF 86

Joins sheet 29
Red Point



Joins sheet 61
Owl Spring

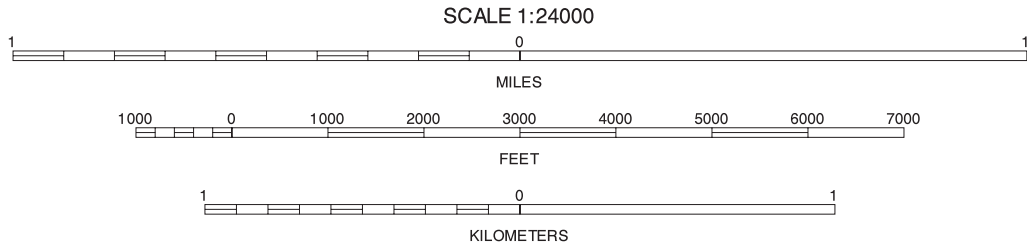
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NORTH



QUADRANGLE LOCATION



27	28	29	27 AGATHLA PEAK
			28 BABY ROCKS
			29 RED POINT
44		46	44 KAYENTA EAST
			46 RED POINT MESA
			61 OWL SPRING
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			63 SWEETWATER MESA

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CHURCH ROCK, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 63
Sweetwater Mesa

Joins sheet 28
Baby Rocks

Joins sheet 30
Dardango

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
RED POINT MESA QUADRANGLE
SHEET NUMBER 46 OF 86

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 29 Red Point

Joins sheet 45 Church Rock

Joins sheet 47 Tail Mesa

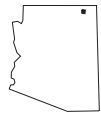
Joins sheet 62
Chilchinbito

Joins sheet 64
White Point

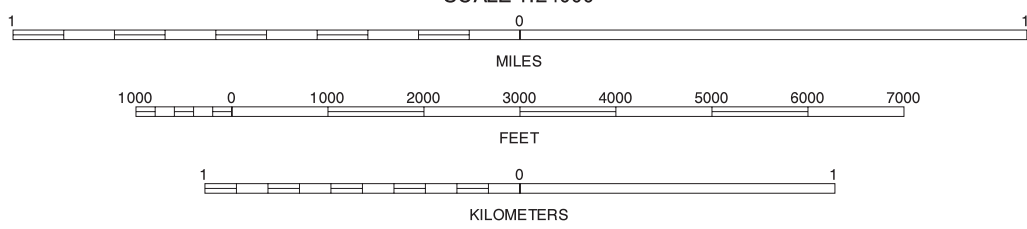
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NORTH



QUADRANGLE LOCATION



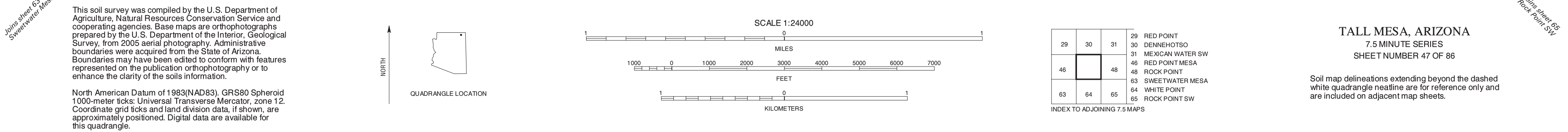
Joins sheet 63 Sweetwater Mesa

28	29	30	28 BABY ROCKS
			29 RED POINT
			30 DENNEHOTSO
45		47	45 CHURCH ROCK
			47 TAIL MESA
			62 CHILCHINBITO
62	63	64	63 SWEETWATER MESA
			64 WHITE POINT

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RED POINT MESA, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.



Joins sheet 30
Dennehotso

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
ROCK POINT QUADRANGLE
SHEET NUMBER 48 OF 86

Joins sheet 31 Mexican Water SW

Joins sheet 47 Tall Mesa

Joins sheet 64
White Point

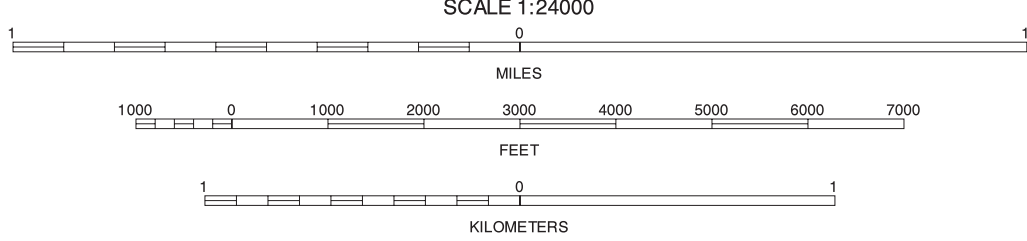
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



30	31	30 DENNEHOTSO
47		31 MEXICAN WATER SW
64	65	47 TALL MESA
		64 WHITE MESA
		65 ROCK POINT SW

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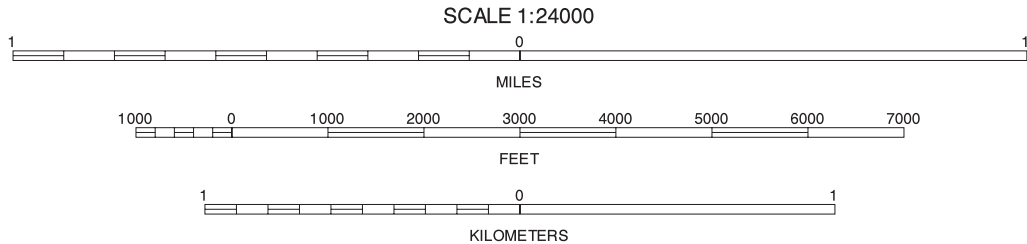
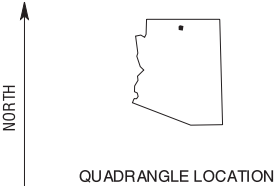
ROCK POINT, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 48 OF 86

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	32	33	32 BITTER SPRINGS
		50	33 EXPLOSIVE ROCK
		66	50 CEDAR TREE HILLS
			66 CEDAR RIDGE

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TANNER WELL, ARIZONA
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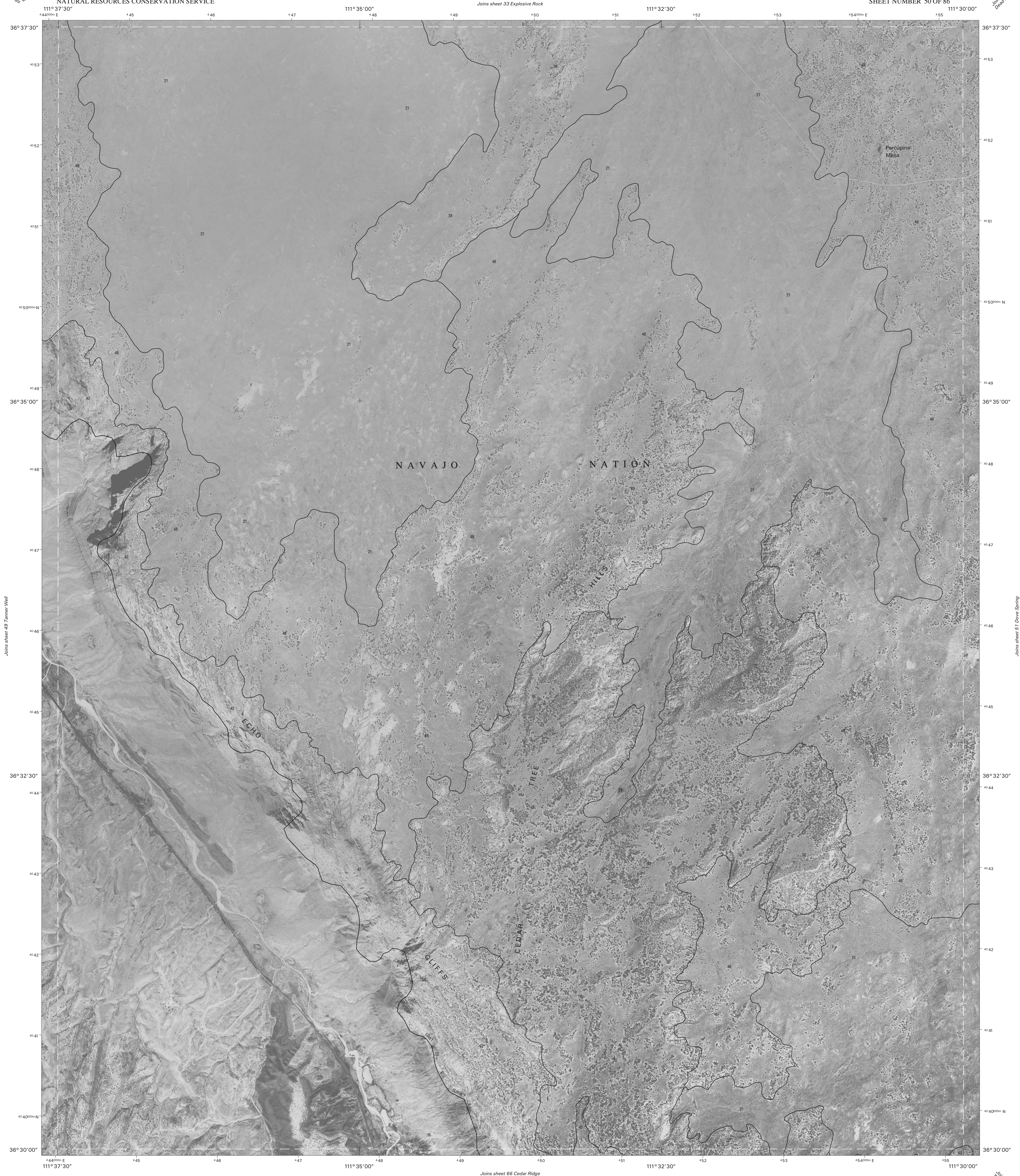
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 32
Bitter Springs

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
CEDAR TREE HILLS QUADRANGLE
SHEET NUMBER 50 OF 86

Joins sheet 34
Dead Monkey Ridge



Joins sheet 43
Tanner Well

Joins sheet 51
Dove Spring

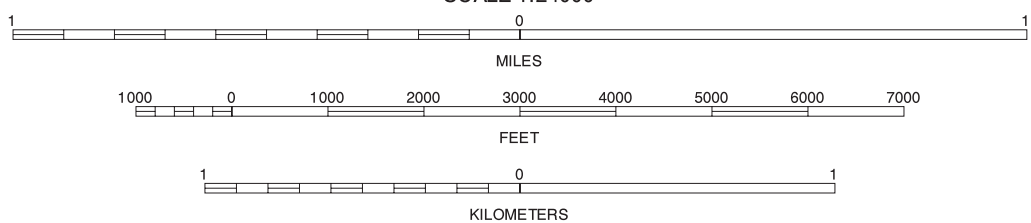
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NORTH



QUADRANGLE LOCATION



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33 EXPLOSIVE ROCK
34 DEAD MONKEY RIDGE
49 TANNER WELL
51 DOVE SPRING
66 CEDAR RIDGE
67 TOH BIH NOSTENY

CEDAR TREE HILLS, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.

Joins sheet 61
Toh Bi Nosteny

Joins sheet 29
Explosive Rock

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
DOVE SPRING QUADRANGLE
SHEET NUMBER 51 OF 86

Joins sheet 35
Many Ghosts Hill



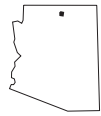
Joins sheet 50 Cedar Tree Hills

Joins sheet 62 Dove Spring SE

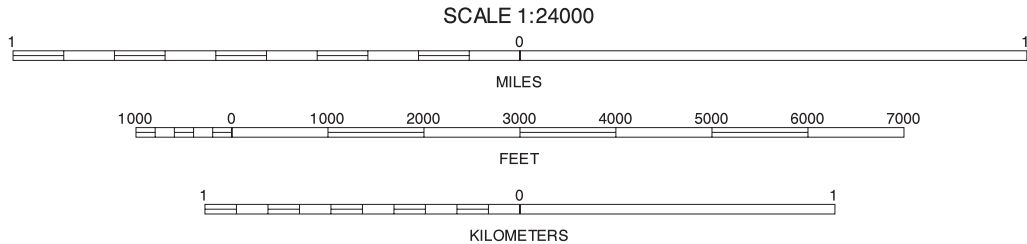
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



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DOVE SPRING, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle neatine are for reference only and are included on adjacent map sheets.

Joins sheet 66
Cedar Ridge

Joins sheet 68
Spring Cedar Hill

Joins sheet 34
Dove Spring Ridge

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
DOVE SPRING SE QUADRANGLE
SHEET NUMBER 52 OF 86

Joins sheet 36
Horseshoe Mesa



Joins sheet 67
Toh Bihi Mts

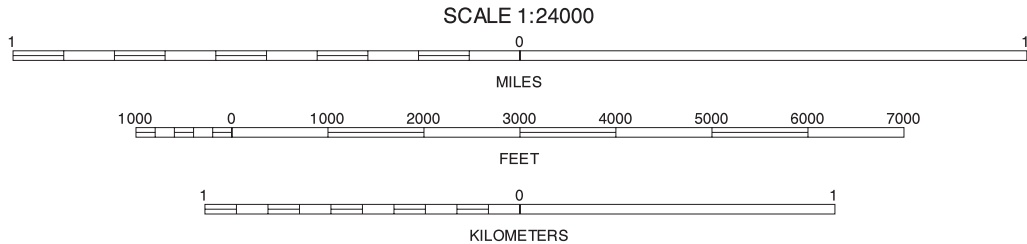
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NORTH



QUADRANGLE LOCATION



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67	68	69

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Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.

Joins sheet 69
Preston Mesa North

Joins sheet 35
Heavy Horse Hill

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
ARROWHEAD MESA QUADRANGLE
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Joins sheet 37
White Hill



Joins sheet 69
Sitting Coyote Hill

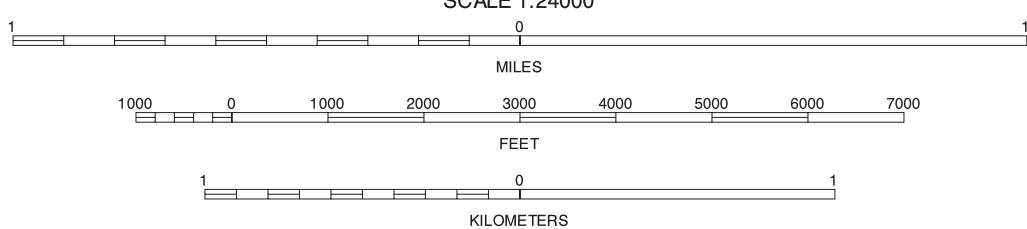
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 2005 aerial photography. Administrative boundaries were acquired from the State of Arizona. Boundaries may have been edited to conform with features represented on the publication orthophotography or to enhance the clarity of the soils information.

North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



35	36	37
52	53	54
68	69	70

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ARROWHEAD MESA, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 53 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 70
Big Whisker Well

Joins sheet 35
Two Red Mesas

Joins sheet 28
Two Red Mesas

Joins sheet 53 Arrowhead Mesa

Joins sheet 55 Square Butte

Joins sheet 69
Preston Mesa North

Joins sheet 71
White Mesa Arch



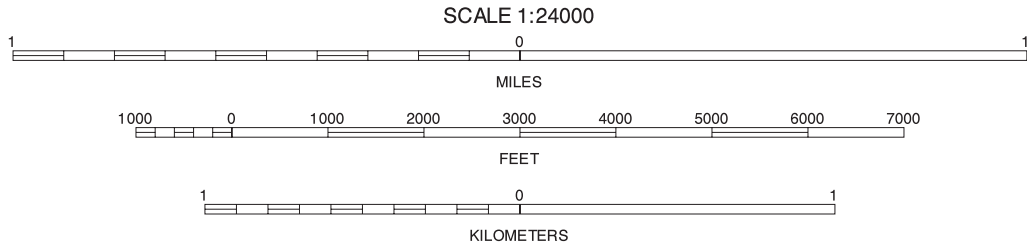
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NORTH



QUADRANGLE LOCATION



36	37	38
53		55
69	70	71

INDEX TO ADJOINING 7.5 MAPS

KAIBITO, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 54 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 37
White Hill

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
SQUARE BUTTE QUADRANGLE
SHEET NUMBER 55 OF 86

Joins sheet 39
Inscription House Ruin



Joins sheet 54
Kaibito

Joins sheet 56
Whirlwind Rock

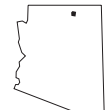
Joins sheet 70
Cow Springs

Joins sheet 72
Cow Springs

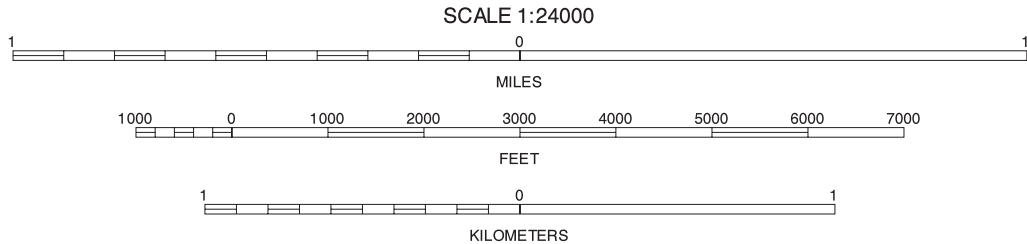
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



37	38	39
54	55	56
70	71	72

- 37 WHITE HILL
- 38 TWO RED MESAS
- 39 INSCRIPTION HOUSE RUIN
- 54 KAIBITO
- 56 WHIRLWIND ROCK
- 70 BIG WHISKER WELL
- 71 WHITE MESA ARCH
- 72 COW SPRINGS

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SQUARE BUTTE, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 39
Two Red Mesas

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
WHIRLWIND ROCK QUADRANGLE
SHEET NUMBER 56 OF 86

Joins sheet 60
Shonto NW



Joins sheet 71
White Mesa Arch

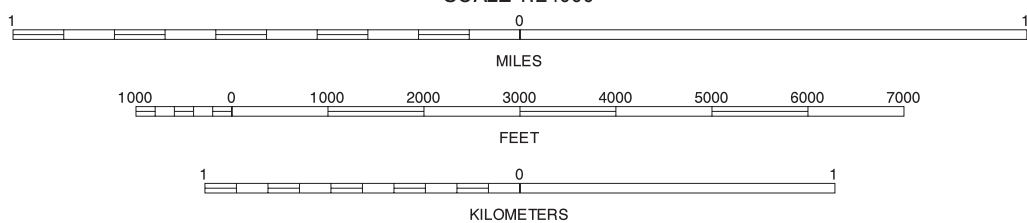
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NORTH



QUADRANGLE LOCATION



38	39	40
55		57
71	72	73

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WHIRLWIND ROCK, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 56 OF 86

Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.

Joins sheet 73
Black Mesa Wash NW

Joins sheet 29
Inscription House Ruin

Joins sheet 41
Black Mesa Wash NE

UNITED STATES
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NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
SHONTO QUADRANGLE
SHEET NUMBER 57 OF 86



Joins sheet 56
Whirlwind Rock

Joins sheet 58
Shonto SE

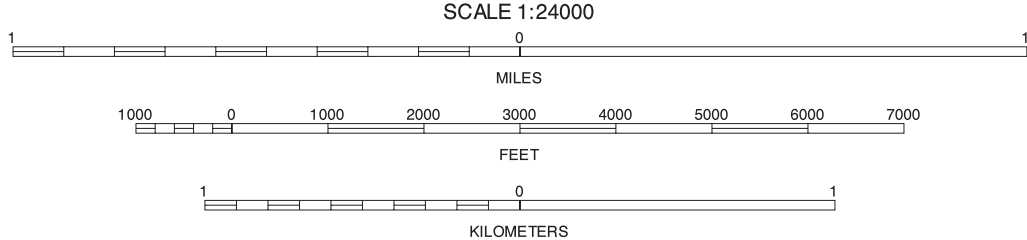
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NORTH



QUADRANGLE LOCATION



39	40	41
56	57	58
72	73	74

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SHONTO, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 57 OF 86

Soil map delineations extending beyond the dashed white quadrangle heatline are for reference only and are included on adjacent map sheets.

Joins sheet 74
Black Mesa Wash NE

Joins sheet 73
Black Mesa Wash NW

Joins sheet 40
Shonto NW

UNITED STATES
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NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
SHONTO SE QUADRANGLE
SHEET NUMBER 58 OF 86

Joins sheet 42
Marsh Pass



Joins sheet 73
Black Mesa Wash NW

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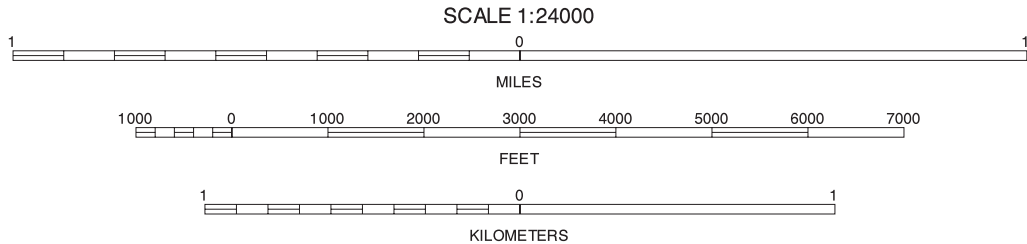
North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION

Joins sheet 74 Black Mesa Wash NE



40	41	42
57		59
73	74	75

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SHONTO SE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 58 OF 86

Soil map delineations extending beyond the dashed white quadrangle heatine are for reference only and are included on adjacent map sheets.

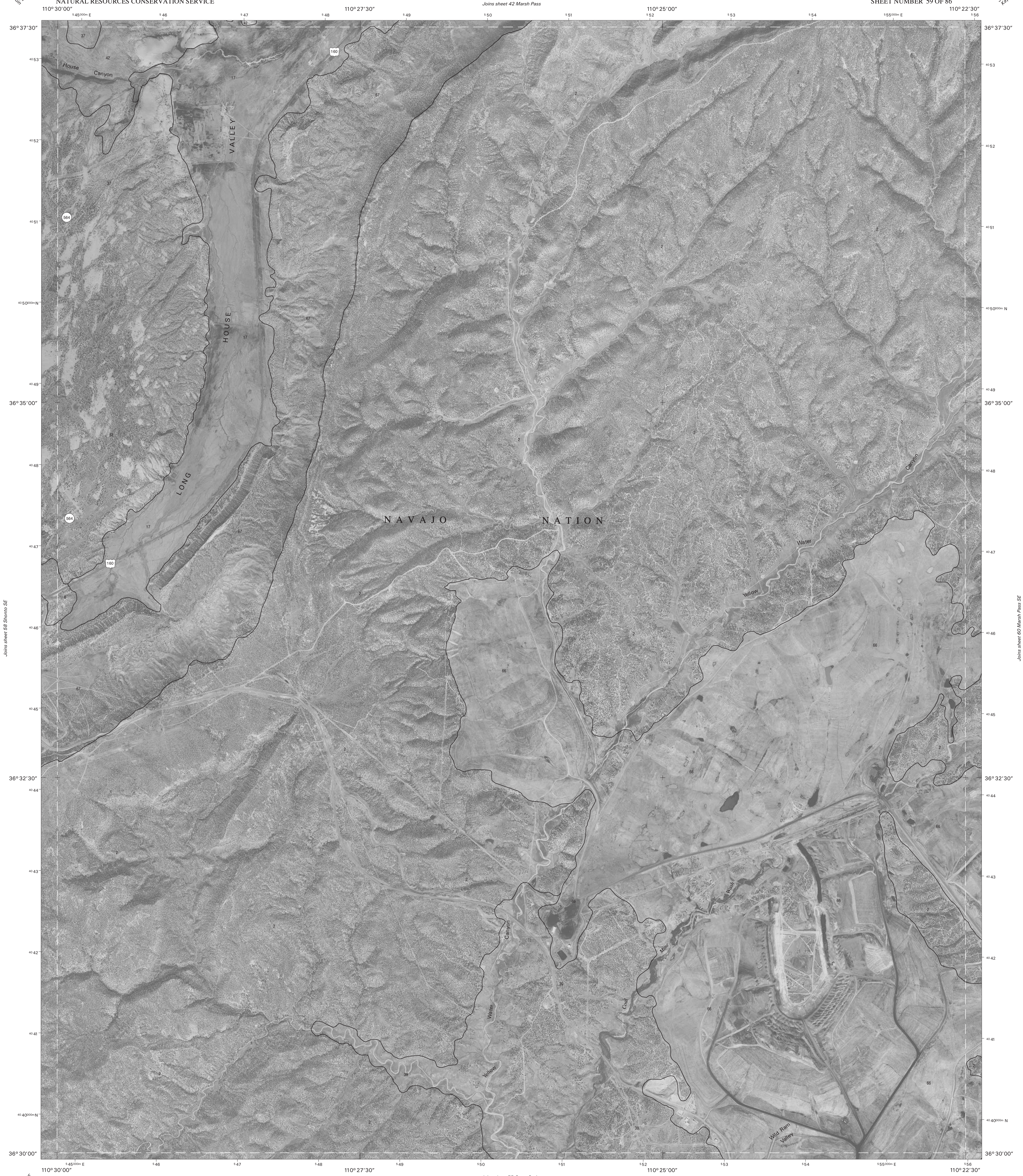
Joins sheet 75
Great Spring

Joins sheet 41
Bartleyville, Utah

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
LONG HOUSE VALLEY QUADRANGLE
SHEET NUMBER 59 OF 86

Joins sheet 43
Kayenta, Arizona



Joins sheet 74
Black Mesa, Arizona NE

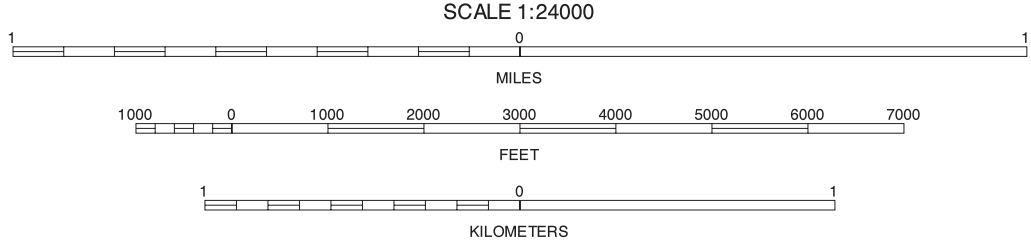
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



41	42	43	41 BETATAKIN RUIN
			42 MARSH PASS
			43 KAYENTA WEST
58		60	58 SHONTO SE
			60 MARSH PASS SE
			74 BLACK MESA WASH NE
74	75	76	75 GREAT SPRING
			76 YUCCA HILL

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LONG HOUSE VALLEY, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle heatine are for reference only and are included on adjacent map sheets.

Joins sheet 76
Yucca Hill, Arizona

Joins sheet 42
Marsh Pass

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NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
MARSH PASS SE QUADRANGLE
SHEET NUMBER 60 OF 86

Joins sheet 44
Kayenta East



Joins sheet 59 Long House Valley

Joins sheet 61 Owl Spring

Joins sheet 75
Great Spring

Joins sheet 77
Cliff Rose Hill

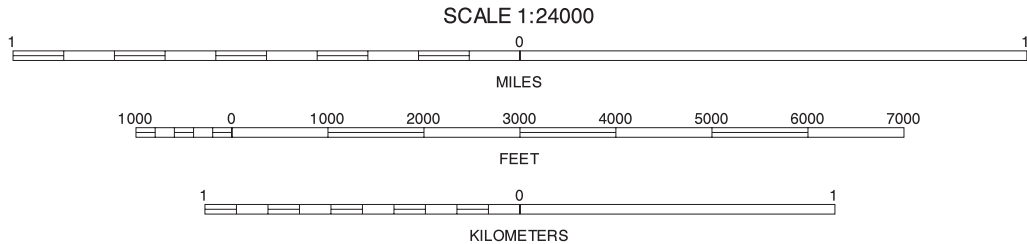
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION

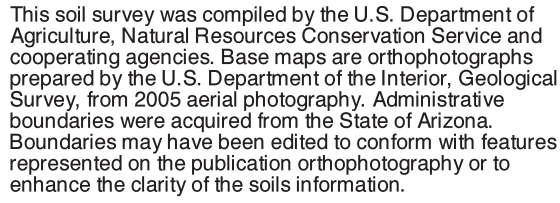


42	43	44	42 MARSH PASS
43	44	45	43 KAYENTA WEST
44	45	46	44 KAYENTA EAST
45	46	47	45 LONG HOUSE VALLEY
46	47	48	46 OWL SPRING
47	48	49	47 GREAT SPRING
48	49	50	48 YUCCA HILL
49	50	51	49 CLIFF ROSE HILL

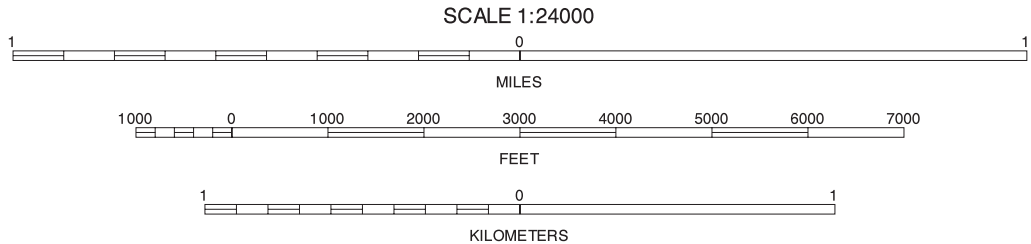
INDEX TO ADJOINING 7.5 MAPS

MARSH PASS SE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 60 OF 86

Soil map delineations extending beyond the dashed white quadrangle heatine are for reference only and are included on adjacent map sheets.



North American Datum of 1983(NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 12.
Coordinate grid ticks and land division data, if shown, are
approximately positioned. Digital data are available for
this quadrangle.



43	44	45	43 KAYENTA WEST
			44 KAYENTA EAST
			45 CHURCH ROCK
60		62	60 MARSH PASS SE
			62 CHILCHINBITO
			76 YUCCA HILL
76	77	78	77 CLIFF ROSE HILL
			78 CHILCHINBITO CANYON

OWL SPRING, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 44
Kayenta East

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NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
CHILCHINBITO QUADRANGLE
SHEET NUMBER 62 OF 86

Joins sheet 46
Red Point Mesa



Joins sheet 61 Owl Spring

Joins sheet 63 Sweetwater Mesa

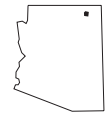
Joins sheet 77
Cliff Rose Hill

Joins sheet 79
Rough Rock NW

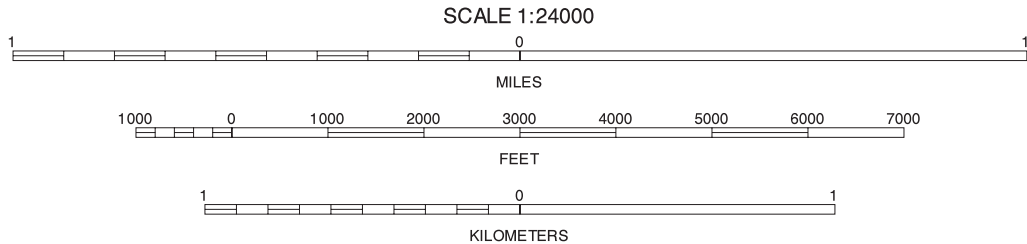
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



44	45	46
61	62	63
77	78	79

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CHILCHINBITO, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 62 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 45
Church Rock

Joins sheet 47
Tall Mesa

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
SWEETWATER MESA QUADRANGLE
SHEET NUMBER 63 OF 86

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 46 Red Point Mesa

110° 00' 00" 109° 57' 30" 109° 55' 00" 109° 52' 30"



Joins sheet 62 Chilchinbito

Joins sheet 64 White Point

110° 00' 00" 109° 57' 30" 109° 55' 00" 109° 52' 30"

Joins sheet 79 Rough Rock NW

Joins sheet 78
Chilchinbito Canyon

Joins sheet 80
Rough Rock

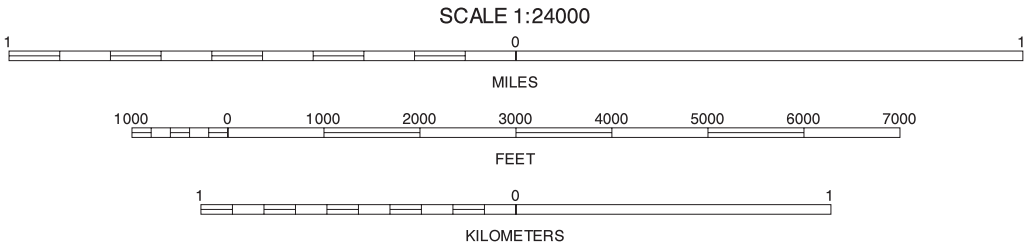
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NORTH



QUADRANGLE LOCATION

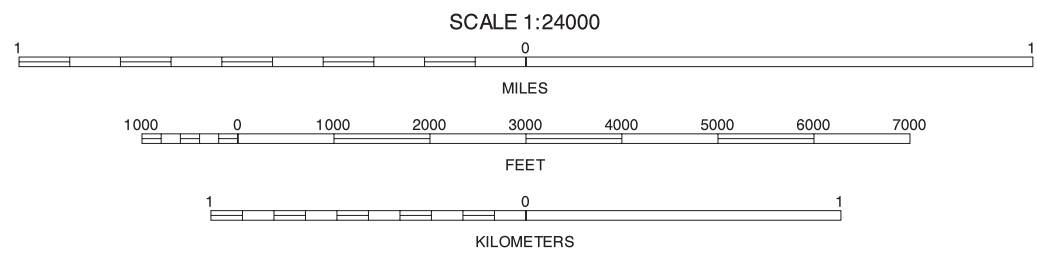
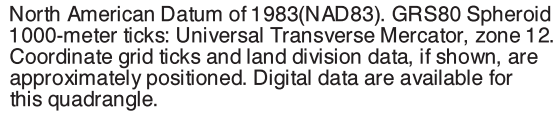


45	46	47
62		64
78	79	80

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SWEETWATER MESA, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 63 OF 86

Soil map delineations extending beyond the dashed white quadrangle headline are for reference only and are included on adjacent map sheets.



46	47	48	46 RED POINT MESA
			47 TALL MESA
			48 ROCK POINT
63		65	63 SWEETWATER MESA
			65 ROCK POINT SW
			79 ROUGH ROCK NW
79	80		80 ROUGH ROCK

WHITE POINT, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 64 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 47
Full Range

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
ROCK POINT SW QUADRANGLE
SHEET NUMBER 65 OF 86

Joins sheet 48 Rock Point



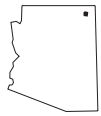
Joins sheet 64 White Point

Joins sheet 80
Rough Rock

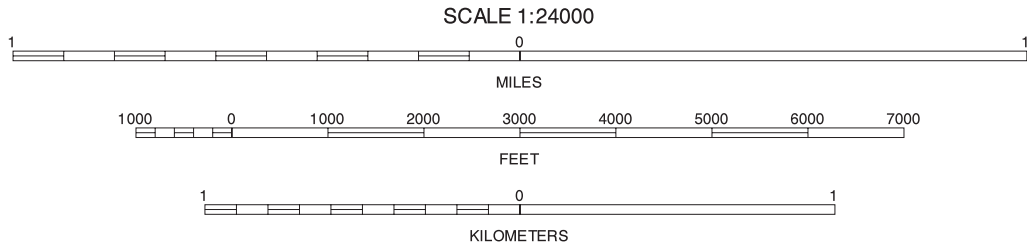
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



47	48		47 TALL MESA
			48 ROCK POINT
64			64 WHITE POINT
			80 ROUGH ROCK

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ROCK POINT SW, ARIZONA
7.5 MINUTE SERIES
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Soil map delineations extending beyond the dashed white quadrangle heatine are for reference only and are included on adjacent map sheets.

Joins sheet 49
Tanner Well

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NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
CEDAR RIDGE QUADRANGLE
SHEET NUMBER 66 OF 86

Joins sheet 51
Dove Spring



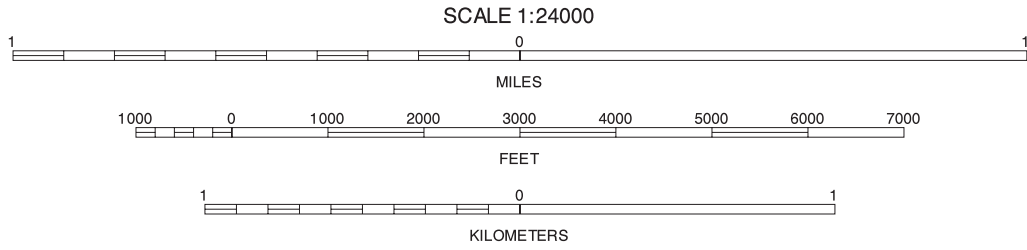
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NORTH



QUADRANGLE LOCATION



49	50	51
		67
		81

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49 TANNER WELL
50 CEDAR TREE HILLS
51 DOVE SPRING
67 TOH BIH NOSTERY
81 THE GAP

CEDAR RIDGE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 66 OF 86

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.

Joins sheet 51
The Gap

Joins sheet 50
Cedar Tree Hills

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
TOH BIH NOSTENY QUADRANGLE
SHEET NUMBER 67 OF 86

Joins sheet 72
Dove Spring &



Joins sheet 65 Cedar Ridge

Joins sheet 69 Sitting Coyote Hill

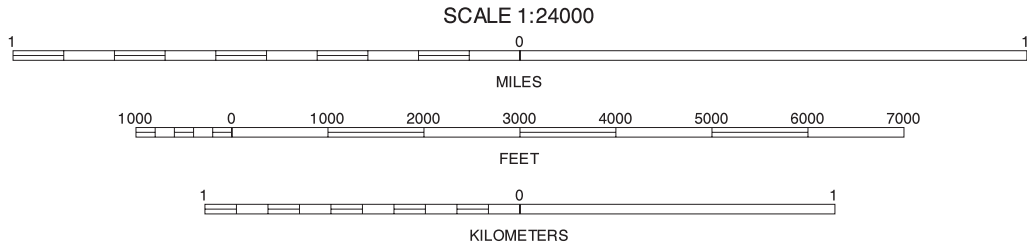
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



50	51	52
50 CEDAR TREE HILLS	51 DOVE SPRING	52 DOVE SPRING SE
66	67	68
66 CEDAR RIDGE	67 SITTING COYOTE HILL	68 THE GAP
81	82	82 PRESTON WELL

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TOH BIH NOSTENY, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 67 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 82
Preston Well

Joins sheet 57
Dove Spring

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DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
SITTING COYOTE HILL QUADRANGLE
SHEET NUMBER 68 OF 86

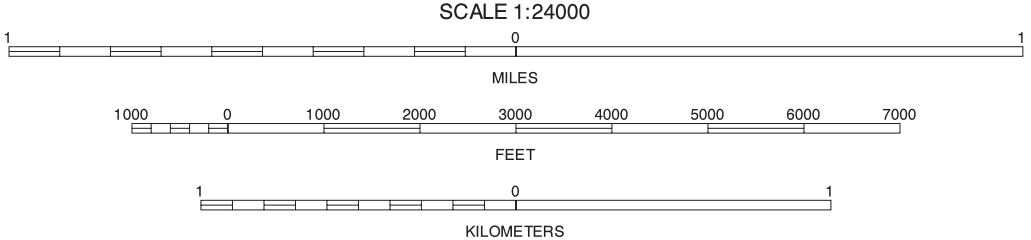
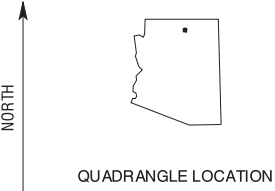
Joins sheet 53
Arrowhead Mesa



Joins sheet 81
The Gap

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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



51	52	53
51 DOVE SPRING	52 DOVE SPRING SE	53 ARROWHEAD MESA
67	68	69
67 TOH BIH NOSTENY	68 SITTING COYOTE HILL	69 PRESTON MESA NORTH
81	82	
81 THE GAP	82 PRESTON WELL	

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SITTING COYOTE HILL, ARIZONA
7.5 MINUTE SERIES
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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 52
Dove Spring SE

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NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
PRESTON MESA NORTH QUADRANGLE
SHEET NUMBER 69 OF 86

Joins sheet 54
Kahito



Joins sheet 82
Preston Hill

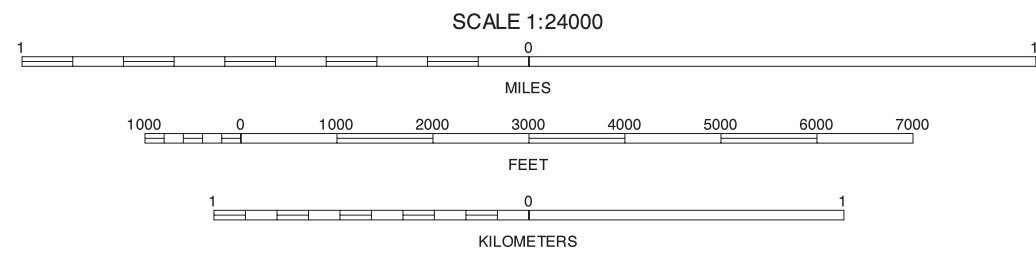
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NORTH



QUADRANGLE LOCATION



52	53	54
52	53	54
52	53	54
52	53	54

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7.5 MINUTE SERIES
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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 85
Gopher Spring

Joins sheet 53
Arrowhead Mesa

UNITED STATES
DEPARTMENT OF AGRICULTURE
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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
BIG WHISKER WELL QUADRANGLE
SHEET NUMBER 70 OF 86

Joins sheet 55
Square Butte

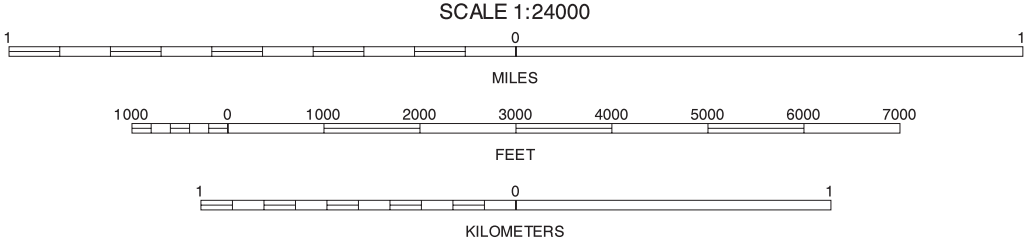
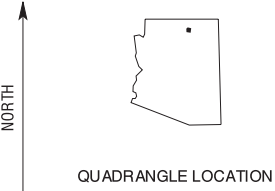


Joins sheet 63 Preston Mesa North

Joins sheet 71 White Mesa Arch

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	83	84

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54 KABITO
55 SQUARE BUTTE
69 PRESTON MESA NORTH
71 WHITE MESA ARCH
83 GOPHER SPRING
84 TONALEA

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Soil map delineations extending beyond the dashed white quadrangle nealtine are for reference only and are included on adjacent map sheets.

Joins sheet 84
Tonalea

Joins sheet 54
Kabito

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
WHITE MESA ARCH QUADRANGLE
SHEET NUMBER 71 OF 86

Joins sheet 86
Whirlwind Rock

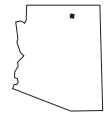


Joins sheet 83
Gopher Spring

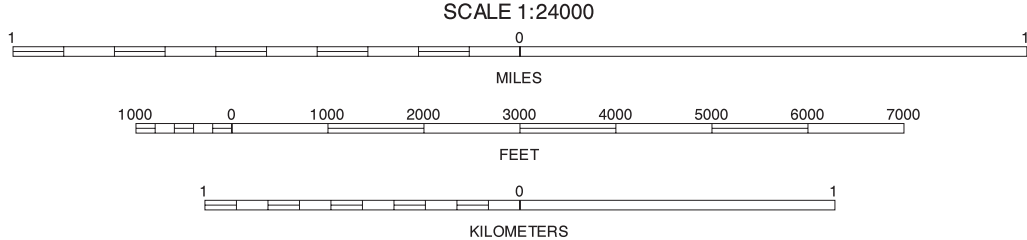
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NORTH



QUADRANGLE LOCATION



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70	71	72
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WHITE MESA ARCH, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle neeline are for reference only and are included on adjacent map sheets.

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John Daw Mesa

Joins sheet 65
Square Butte

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
COW SPRINGS QUADRANGLE
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Joins sheet 57
Shonto

Joins sheet 71 White Mesa Arch

Joins sheet 73 Black Mesa Wash NW



Joins sheet 84
Tonalea

Joins sheet 85 John Daw Mesa

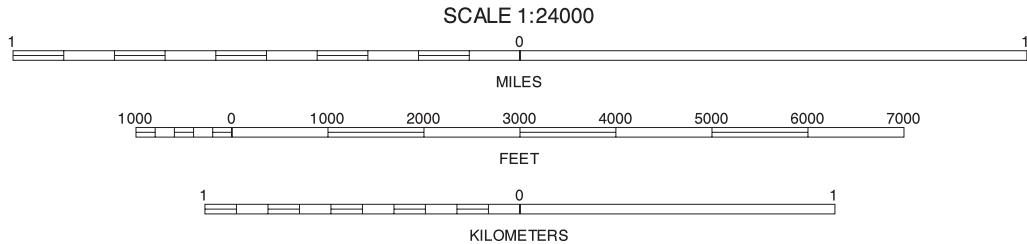
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NORTH



QUADRANGLE LOCATION



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71	72	73
84	85	

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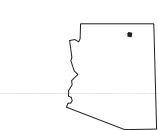
55 SQUARE BUTTE
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71 WHITE MESA ARCH
73 BLACK MESA WASH NW
84 TONALEA
85 JOHN DAW MESA

COW SPRINGS, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 72 OF 86

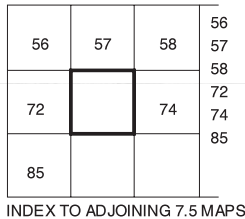
Soil map delineations extending beyond the dashed white quadrangle neatine are for reference only and are included on adjacent map sheets.



North American Datum of 1983(NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUADRANGLE LOCATION



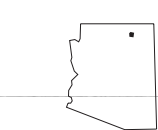
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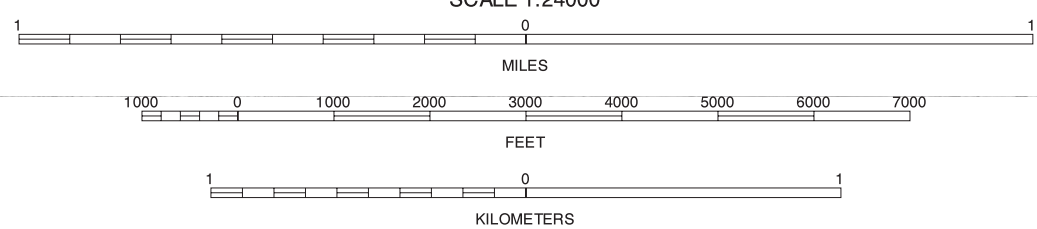
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1000-meter ticks: Universal Transverse Mercator, zone 12.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



57	58	59	57 SHONTO
			58 SHONTO SE
			59 LONG HOUSE VALLEY
73		75	73 BLACK MESA WASH NW
			75 GREAT SPRING

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BLACK MESA WASH NE, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle neastine are for reference only and are included on adjacent map sheets.

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Shonto SE

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
GREAT SPRING QUADRANGLE
SHEET NUMBER 75 OF 86

Joins sheet 60
Marsh Pass SE



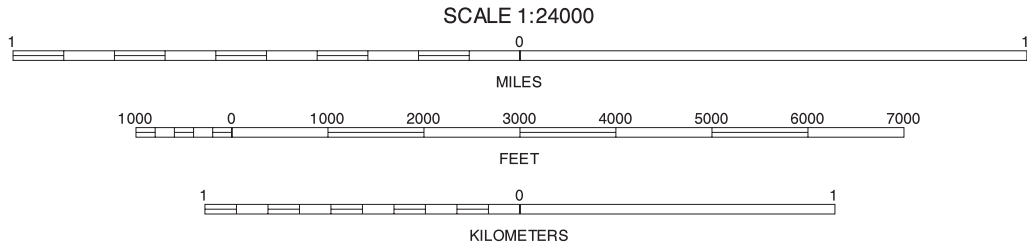
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NORTH



QUADRANGLE LOCATION



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59 LONG HOUSE VALLEY
60 MARSH PASS SE
74 BLACK MESA WASH NE
76 YUCCA HILL

GREAT SPRING, ARIZONA
7.5 MINUTE SERIES
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Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.

Joins sheet 59
Long House Valley

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NATURAL RESOURCES CONSERVATION SERVICE

NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
YUCCA HILL QUADRANGLE
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Joins sheet 61
Owl Spring



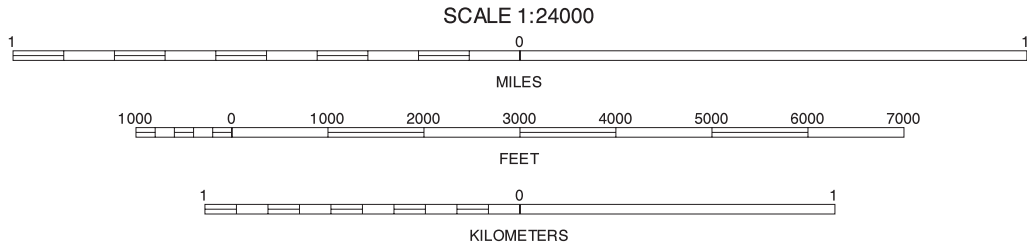
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NORTH



QUADRANGLE LOCATION



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75	76	77

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YUCCA HILL, ARIZONA
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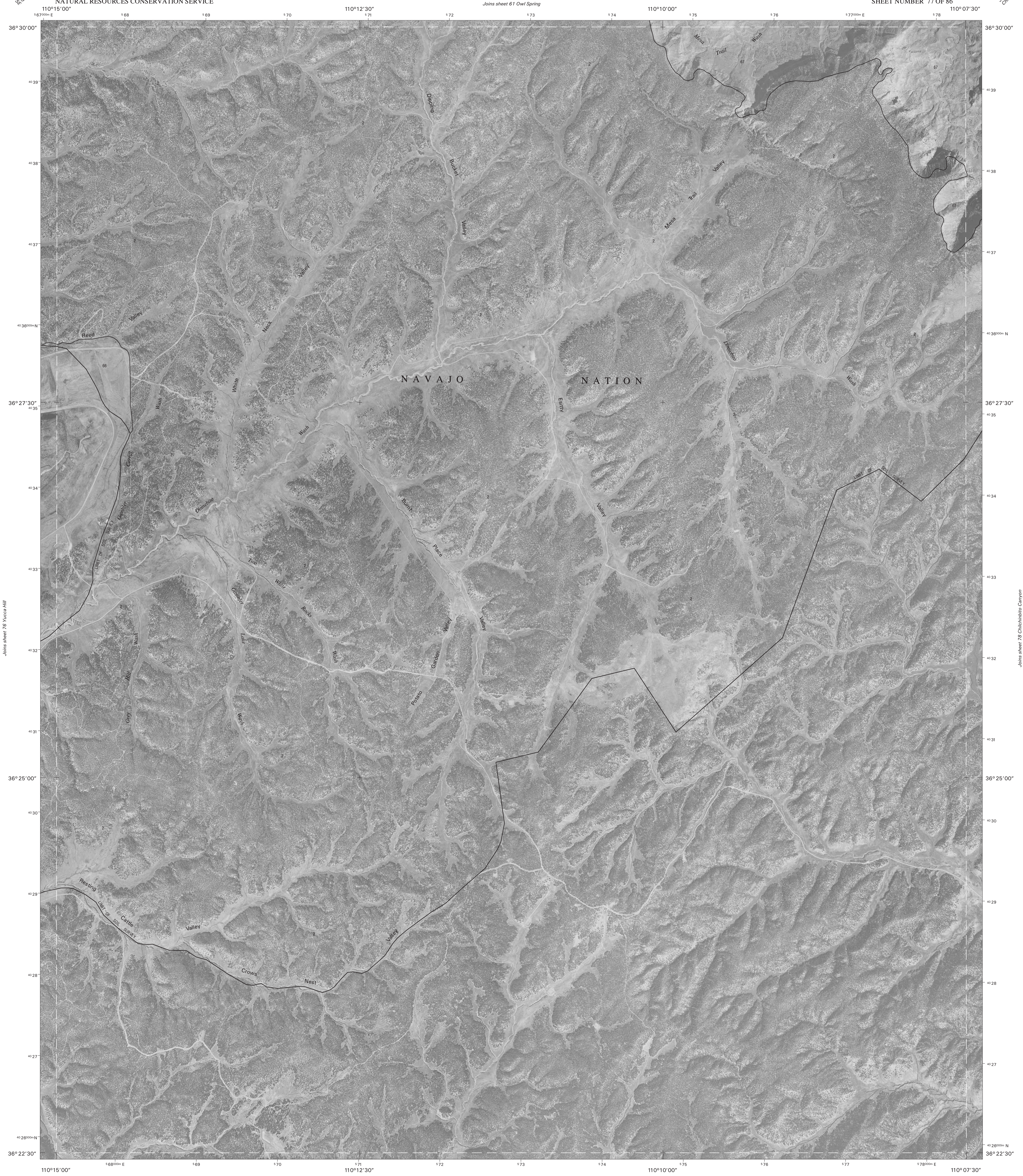
Soil map delineations extending beyond the dashed white quadrangle neeline are for reference only and are included on adjacent map sheets.

Joins sheet 60
Marsh Pass SE

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Joins sheet 62
Chilchibito



Joins sheet 76
Yucca Hill

Joins sheet 78
Chilchibito Canyon

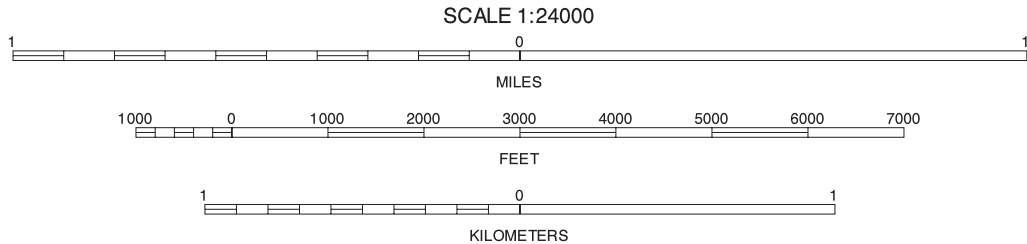
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NORTH



QUADRANGLE LOCATION



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76	77	78
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CLIFF ROSE HILL, ARIZONA
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SHEET NUMBER 77 OF 86

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 61
Owl Spring

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
CHILCHINBITO CANYON QUADRANGLE
SHEET NUMBER 78 OF 86

Joins sheet 63
Sweetwater Mesa



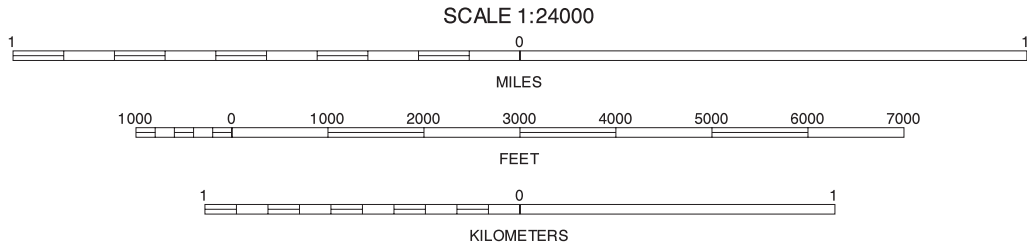
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NORTH



QUADRANGLE LOCATION



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CHILCHINBITO CANYON, ARIZONA
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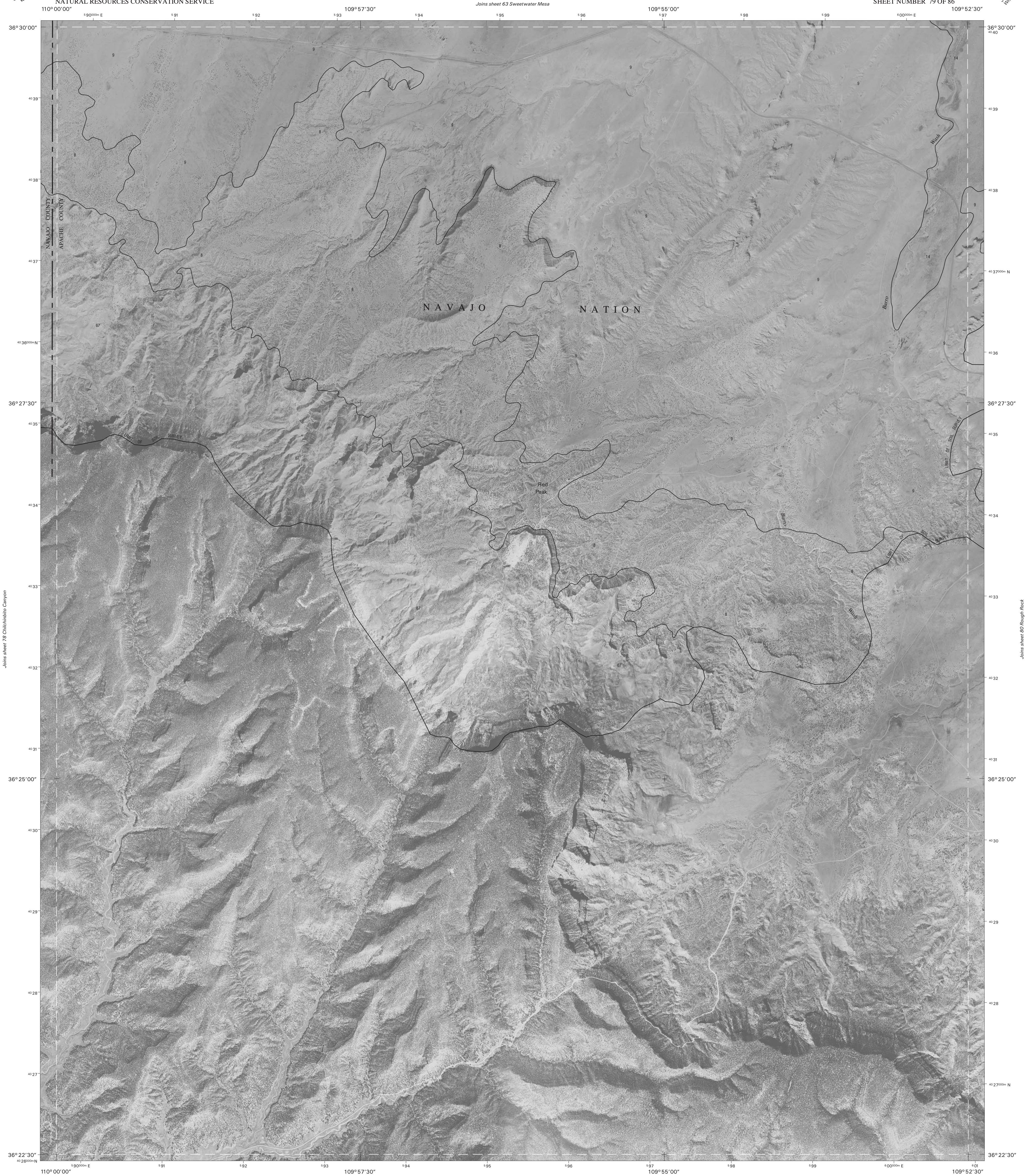
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 62
Chilchinbito

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
ROUGH ROCK NW QUADRANGLE
SHEET NUMBER 79 OF 86

Joins sheet 64
White Point



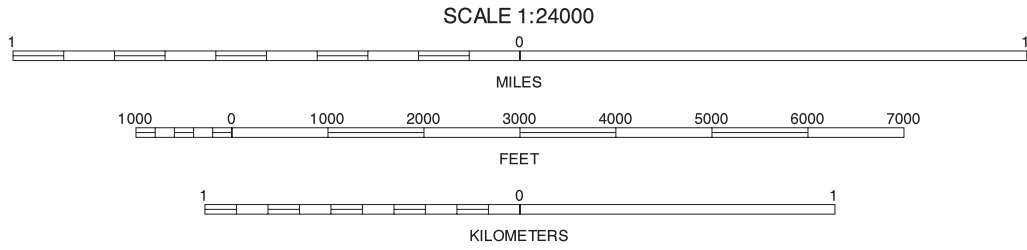
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North American Datum of 1983(NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



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ROUGH ROCK NW, ARIZONA
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Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.

Joins sheet 62
Sweetwater Mesa

UNITED STATES
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NAVAJO MOUNTAIN AREA, ARIZONA
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ROUGH ROCK QUADRANGLE
SHEET NUMBER 80 OF 86

Joins sheet 65
Rock Point SW



Joins sheet 79 Rough Rock NW

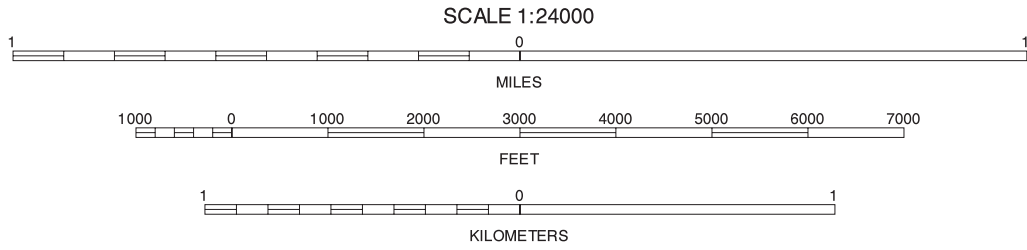
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NORTH



QUADRANGLE LOCATION



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ROUGH ROCK, ARIZONA
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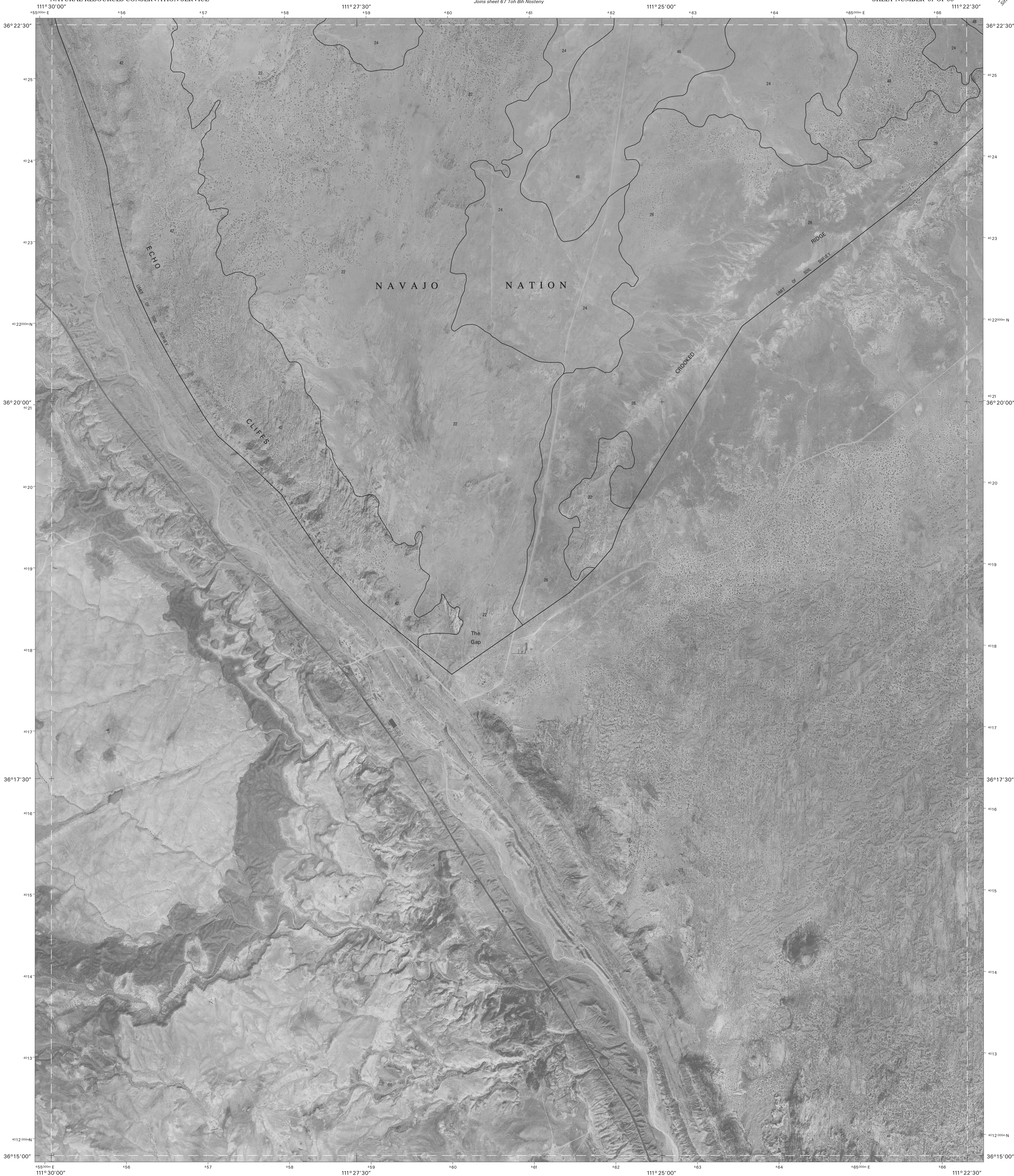
Soil map delineations extending beyond the dashed white quadrangle neatine are for reference only and are included on adjacent map sheets.

Joins sheet 66
Cedar Ridge

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Sitting Coyote Hill



Joins sheet 82 Preston Well

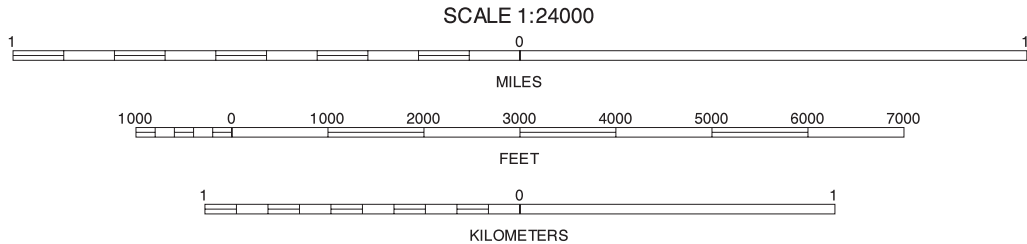
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North American Datum of 1983(NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



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68 SITTING COYOTE HILL
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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 67
To the NW corner

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
PRESTON WELL QUADRANGLE
SHEET NUMBER 82 OF 86

Joins sheet 69
To the NE corner



Joins sheet 81
To the SW corner

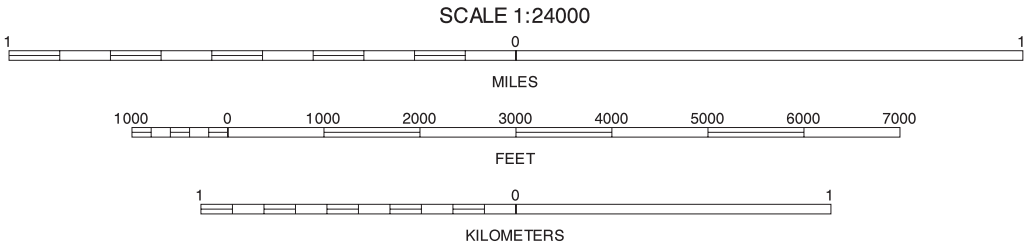
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North American Datum of 1983(NAD83), GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 12.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



67	68	69	67 TOH BIH NOSTENY
			68 SITTING COYOTE HILL
			69 PRESTON MESA NORTH
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Soil map delineations extending beyond the dashed white quadrangle nealtline are for reference only and are included on adjacent map sheets.

Soils sheet 69
Preston Mesa North

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
GOPHER SPRING QUADRANGLE
SHEET NUMBER 83 OF 86

Joins sheet 71
White Mesa Arch



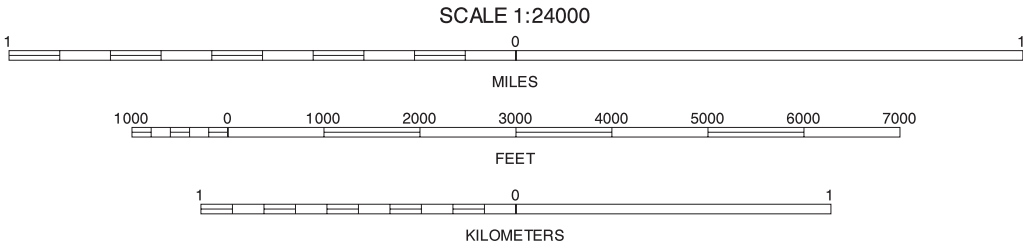
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North American Datum of 1983(NAD83), GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 12.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



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	86	

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70 BIG WHISKER WELL
71 WHITE MESA ARCH
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86 MIDDLE MESA

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Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.

Joins sheet 70
Big Whisker Well

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NAVAJO MOUNTAIN AREA, ARIZONA
PARTS OF APACHE, COCONINO AND NAVAJO COUNTIES
TONALEA QUADRANGLE
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Joins sheet 72
Cow Springs

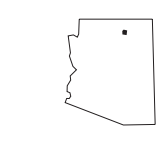


Joins sheet 86
Middle Mesa

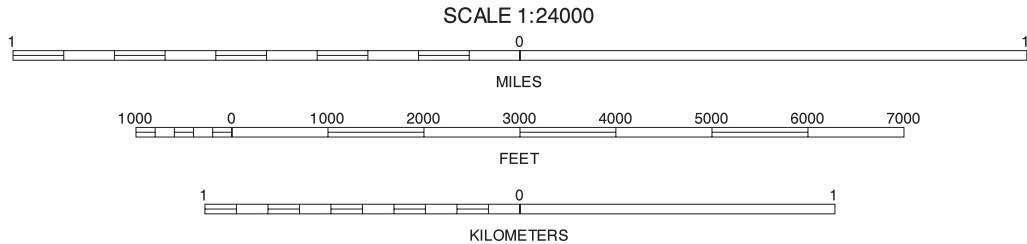
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North American Datum of 1983(NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



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72 COW SPRINGS
83 GOPHER SPRING
85 JOHN DAW MESA
86 MIDDLE MESA

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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 71
White Mesa Arch

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NAVAJO MOUNTAIN AREA, ARIZONA
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JOHN DAW MESA QUADRANGLE
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Joins sheet 73
Black Mesa Wash NW



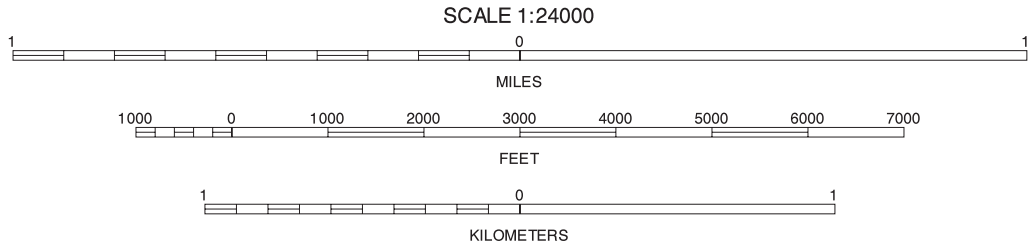
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North American Datum of 1983 (NAD83), GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUADRANGLE LOCATION



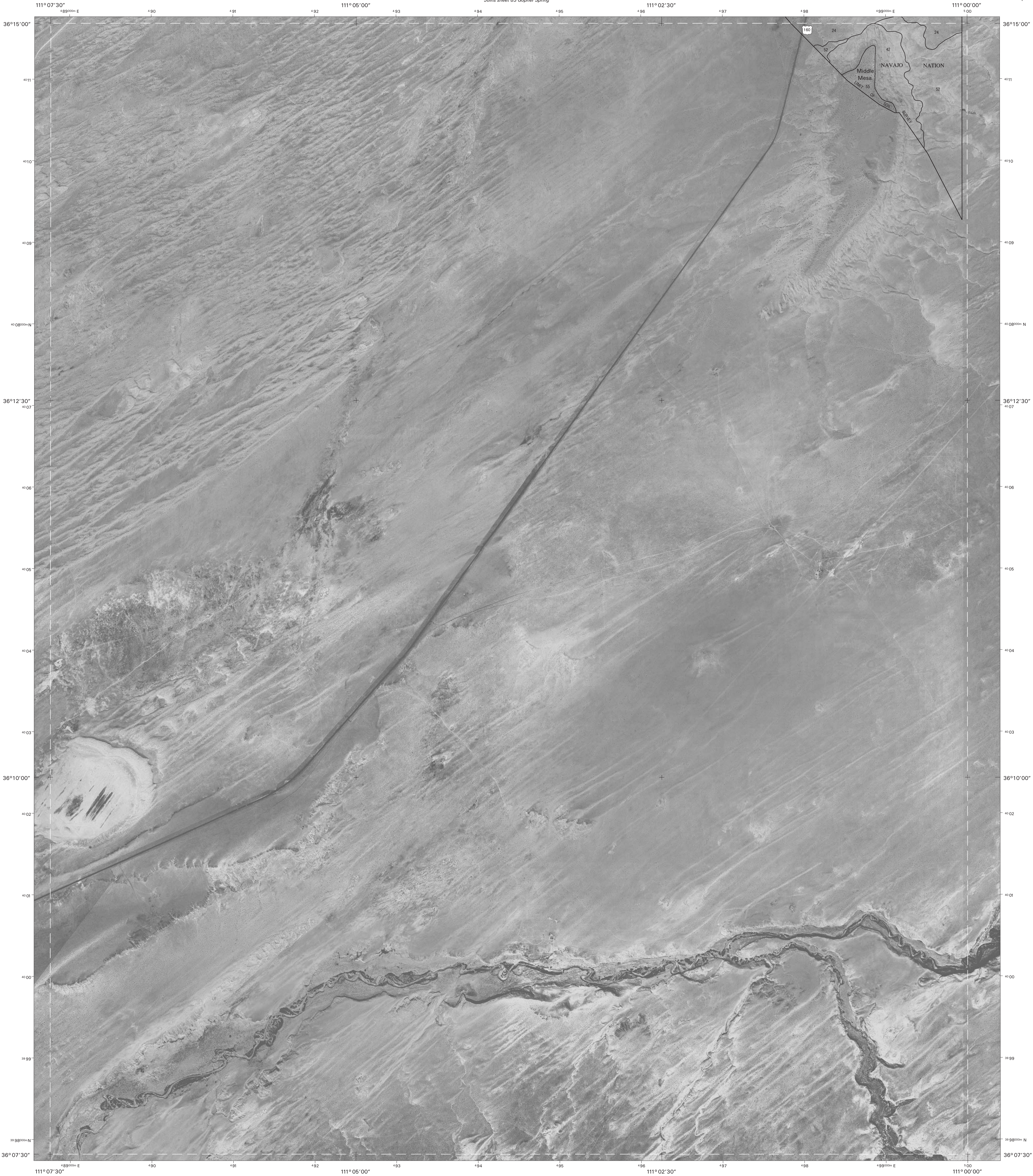
71	72	73
84		

71 WHITE MESA ARCH
72 COW SPRINGS
73 BLACK MESA WASH NW
84 TONALEA

INDEX TO ADJOINING 7.5 MAPS

JOHN DAW MESA, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 85 OF 86

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.



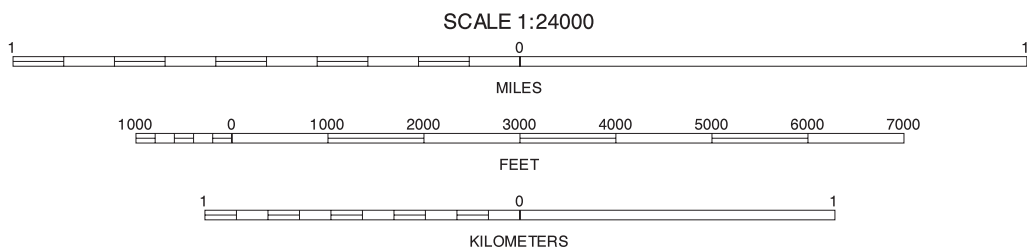
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NORTH



QUADRANGLE LOCATION



	83	84	83 GOPHER SPRING
			84 TONALEA

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MIDDLE MESA, ARIZONA
7.5 MINUTE SERIES
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